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WAR MACHINE

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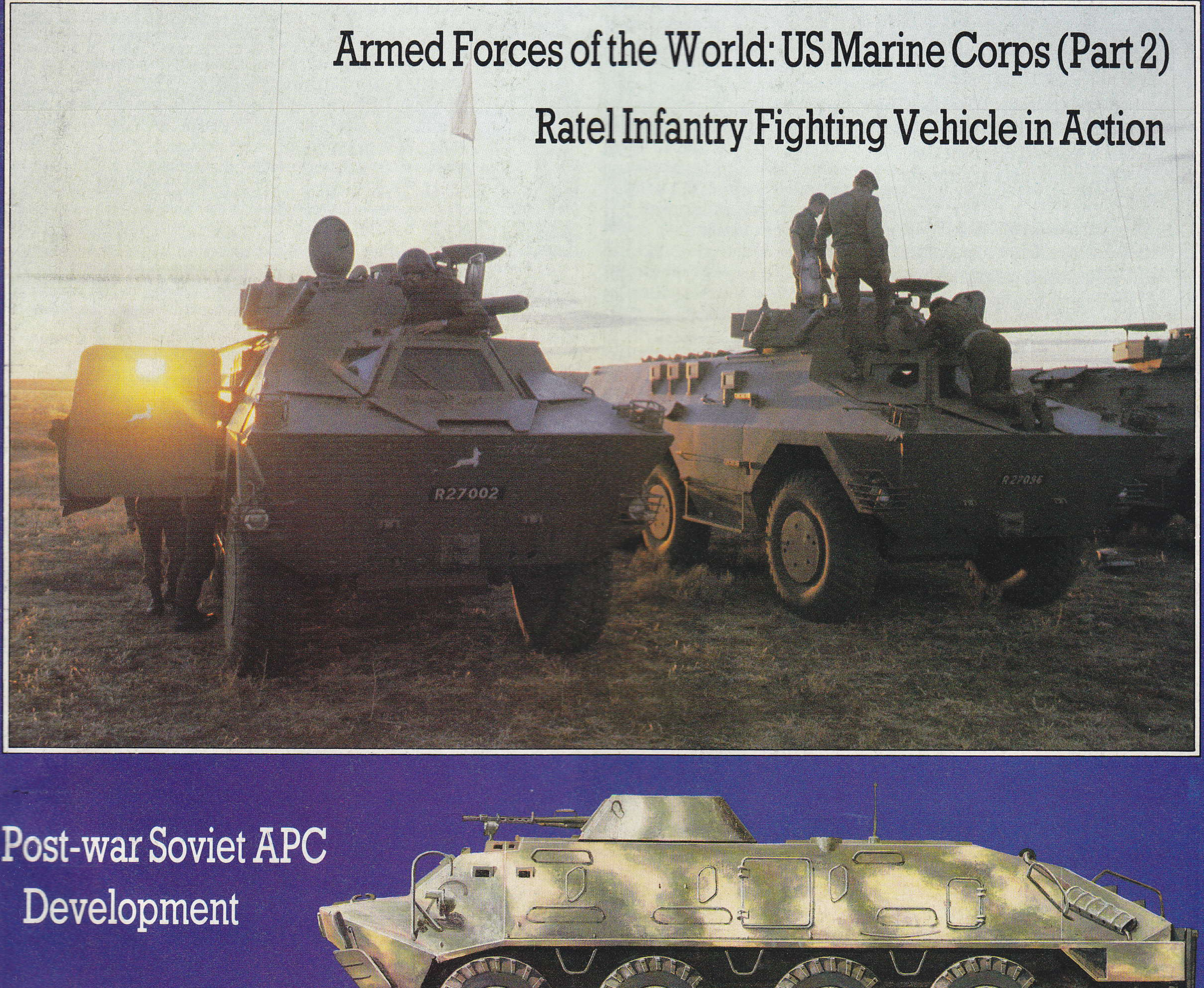
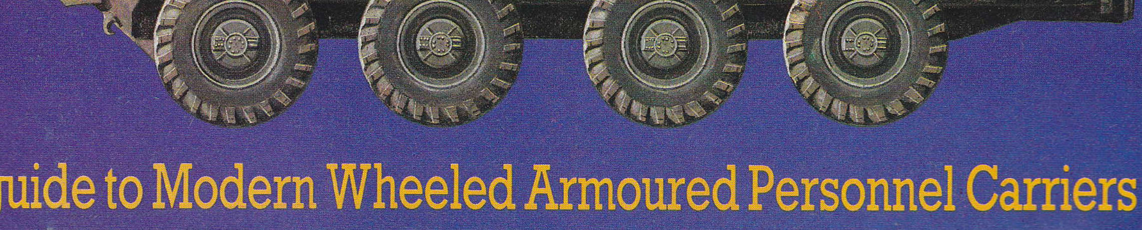
Armed Forces of the World: US Marine Corps (Part 2)

Ratel Infantry Fighting Vehicle in Action



Post-war Soviet APC Development

Kabul Convoy



A fully illustrated guide to Modern Wheeled Armoured Personnel Carriers

WAR MACHINE

Volume 5 **Issue 58**

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Armed Forces of the World

US Marine Corps (Part 2) iii

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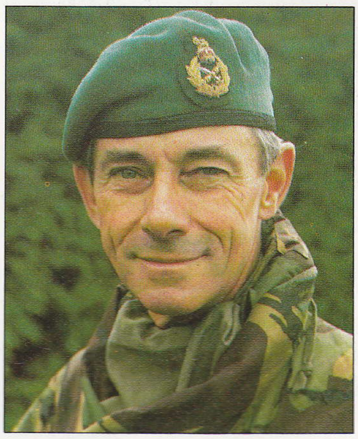

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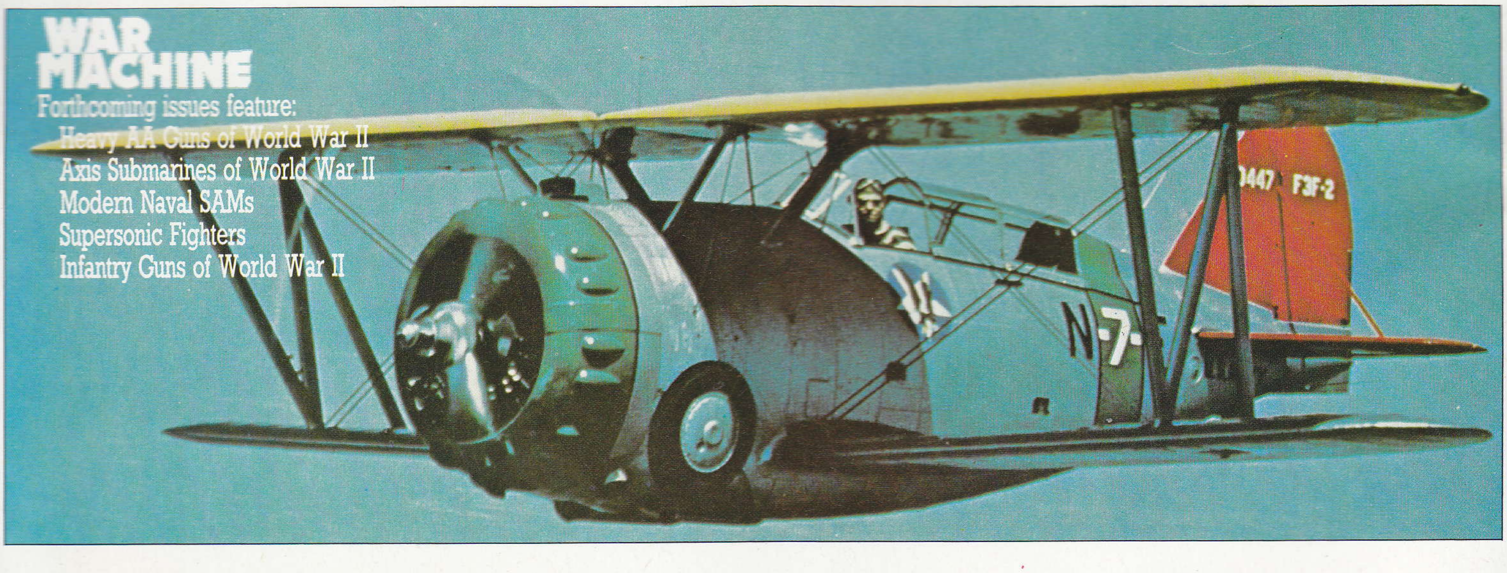
Cover photograph: Two South African Ratel (6×6) IFVs are prepared for action in Namibia.



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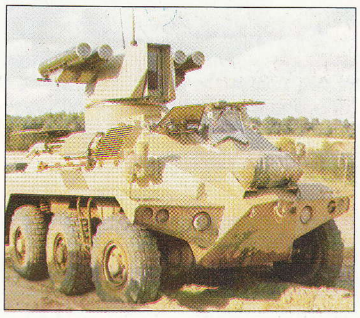
Modern Wheeled Armoured Personnel Carriers

Part 1

In spite of the rise in importance of the tracked vehicle in the armies of the world, the wheeled APC remains an important item in the military inventory. It is particularly useful in second-echelon tasks and for the increasingly important internal security role.



Many armoured personnel carriers are today fitted with long range anti-tank guided weapons, so turning them into highly effective tank destroyers. This Panhard VCR (6×6) has a Euromissile UTM-800 turret with four Euromissile HOT missiles ready to launch.

For many years wheeled armoured personnel carriers possessed only limited cross-country mobility compared with their tracked counterparts, and therefore were often limited to roads, being used to transport troops from the rear area to points near the front line where the men dismounted to fight on foot. Some countries, including the United States, had no requirement for wheeled armoured personnel carriers at all, and it was not until the Vietnam conflict that the US Army purchased large numbers of the private venture Cadillac Gage V-100 4×4 Commando range of multi-purpose vehicles . It should be noted, however, that these were used mainly for escorting convoys of supplies from one camp to another or patrolling high risk areas such as airports, fuel dumps and ammunition compounds, rather than for transporting troops into action.

The Soviet Union, on the other hand, has continued to develop both tracked and wheeled armoured personnel carriers on an almost continual basis, and the two types are complementary. The tracked vehicles have excellent cross-country mobility and are therefore capable of keeping up with tanks and other armoured fighting vehicles moving across country, while the wheeled armoured personnel carriers have a greater road speed and therefore better strategic mobility, so that troops can be quickly brought up from the rear areas to exactly where they are needed, or switched from one area to another at short notice.

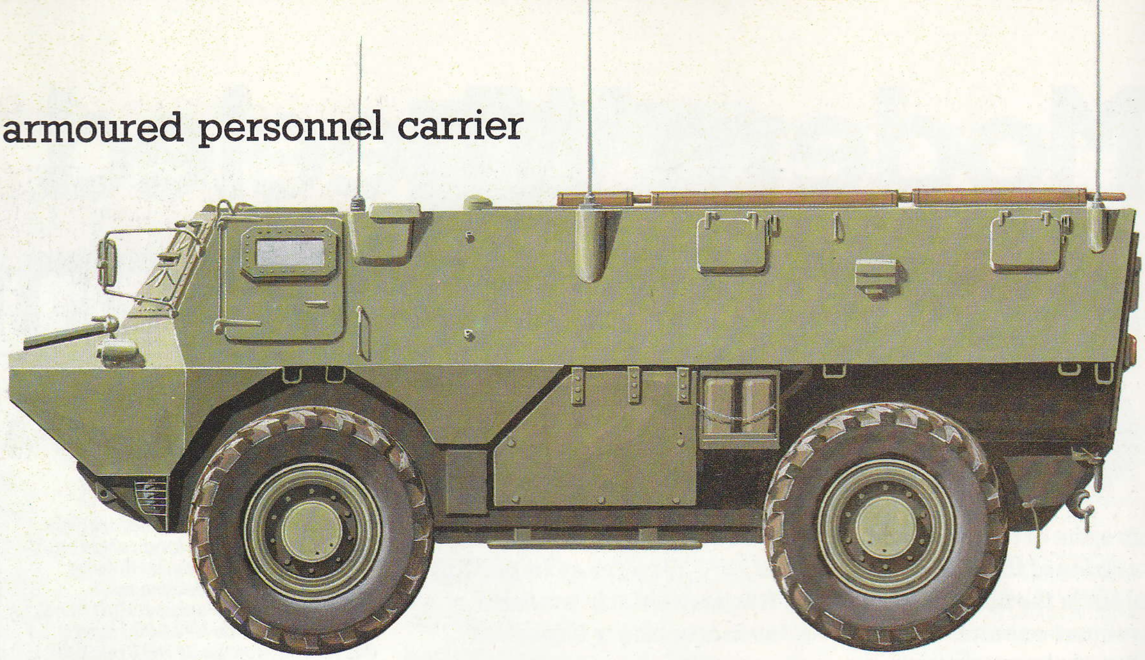
The United Kingdom started development programmes for full-tracked armoured personnel carriers soon after the end of World War II, but it was the Alvis Saracen 6×6 vehicle which entered service first, this sharing many components with the Alvis Saladin 6×6 armoured car developed at the same time. The Saracen was rushed into production as it was urgently needed in Malaya during the early 1950s. Many of the modern wheeled armoured personnel carriers described here use the same automotive components as an armoured car developed by the same company (the M3 has 95 per cent common automotive components with the AML armoured car, for example) with obvious logistical training and financial savings for the operators.

For the internal security role special versions of wheeled armoured personnel carriers have been developed, these normally equipped with barricade-clearing equipment, CS gas dispensers or water cannon, and special protection against petrol bombs which can easily cause a vehicle to catch fire, so forcing the occupants to leave their vehicle. Instead of using heavily armoured wheeled armoured personnel carriers, many countries use modified light vehicles such as the Land Rover, these being normally provided with protection from small arms fire and nail bombs. They do not provide the same degree of protection as vehicles like the VAB or Transportpanzer, but their small size makes them useful in most riot-control situations, where the employment of larger vehicles, often clearly identified as military, can make the situation even worse.

A convoy of South African Ratel APCs depart at dawn from the Operational Area in Namibia for a raid deep into Angola. These raids are often large operations supported by artillery, aircraft and helicopters, and the Ratel has been designed for use in this testing environment.

FRANCE

Renault VAB armoured personnel carrier



Above: At present the French army uses only the 4×4 VAB, which is slightly cheaper than the 6×6. This particular VAB is not fitted with water jets under the hull at the rear, or with a roof-mounted weapon station, which normally carries a 7.62-mm (0.3-in) MG.

Some years ago the French army decided to issue its infantry battalions with both tracked and wheeled armoured personnel carriers, the former being the AMX-10P built by the ARE. To meet the requirement for the wheeled vehicle, designated **VAB** (*Véhicle de l'Avant Blindé*, or front armoured vehicle), prototypes were built by Panhard and Saviem/Renault in both 4×4 and 6×6 configurations. In May 1974 the Renault design was selected, and first production vehicles were delivered to the French army in 1976. The total French army requirement is for at least 4,000 vehicles, and production is already running at between 30 and 50 vehicles per month. The VAB has been offered on the export market, and by mid-1984 over 800 had been exported, sales having been made to the Ivory Coast, Cyprus, Lebanon, Mauritius, Morocco, Oman, Qatar and the United Arab Emirates. Of these Morocco is the largest operator, having purchased over 400 vehicles; some of these have already been lost in the fighting in the Sahara against the Polisario guerrillas.

The VAB is currently produced in 4×4 and 6×6 configurations, the latter costing about 10 per cent more but having greater cross-country capability. At present the French army uses only the 4×4 model.

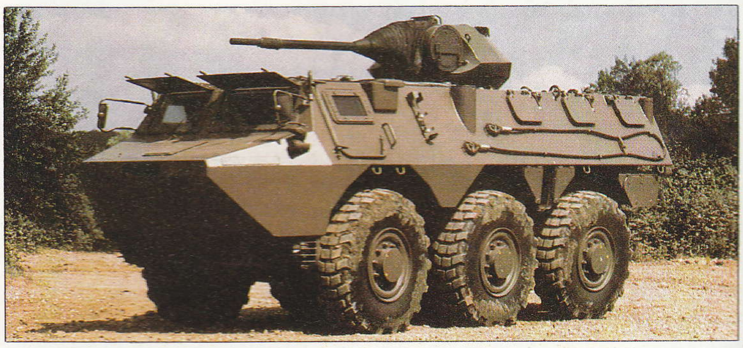
The VAB has a hull of all-welded steel armour construction with the driver and commander at the front (the latter also operating the roof-mounted 7.62-mm/0.3-in machine-gun), the engine compartment to their immediate rear, and the troop compartment at the rear of the hull; an aisle connects the front of the vehicle with the troop compartment. The infantry enter and leave via two doors in the hull rear, and the troops are seated five down each side facing the centre. The VAB is fully amphibious, being propelled in the water by its wheels or, as an option, by two waterjets at the rear of the hull. Standard equipment on French army vehicles includes an NBC system and passive night-vision equipment.

French army VABs are fitted with a cupola-mounted 7.62-mm (0.3-in) machine-gun, but a wide range of other armament options is available, including turret-mounted 12.7-mm (0.5-in) machine-guns and 20-mm cannon. The basic vehicle has also been adopted for a wide range of other roles including a forward ambulance, internal security vehicle, command vehicle, repair vehicle, 81-mm mortar carrier, 120-mm (4.72-in) mortar tower, anti-aircraft vehicle (with twin 20-mm rapid-fire cannon or short range SAMs) and anti-tank vehicle. There are two versions of the latter, the **UTM 800** and the **Mephisto**. The former has a turret with four HOT ATGWs in the ready-to-launch position, while the latter has a similar number of HOT ATGWs on a launcher retracted flush along the top of the hull until it is required for action.

To reduce operation and procurement costs, well tried commercial components have been used in the design of the VAB range of armoured vehicles. Using the same automotive components, Renault has designed the **VBC 90** 6×6 armoured car which is now in service with Oman and the French Gendarmerie.

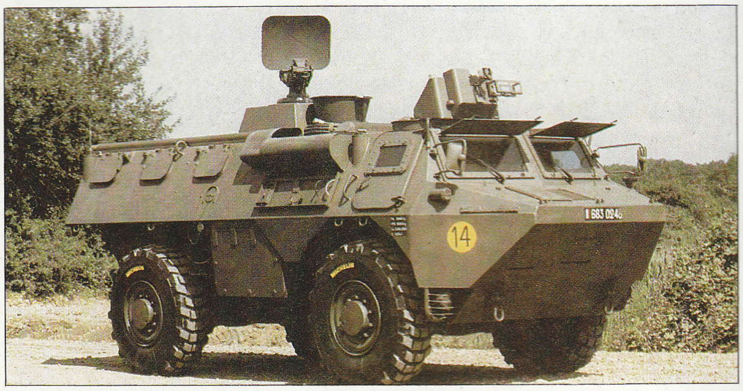
Specification

VAB (4×4 model)
Crew: 2+10
Combat weight: 13000 kg (28,660 lb)
Powerplant: one MAN 6-cylinder inline diesel developing 235 hp (175 kW)
Dimensions: length 5.98 m (19 ft 7.4 in); width 2.49 m (8 ft 2 in); height without armament 2.06 m (6 ft 9 in)
Performance: maximum road speed 92 km/h (57 mph); maximum road range 1000 km (621 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.6 m (2 ft 0 in); trench not applicable



Above: A Renault VAB (6×6) for the export market, fitted with the new Creusot-Loire one-man turret armed with a 20-mm cannon. The VAB can be fitted with a wide range of armament systems to enable it to undertake different roles on the battlefield.

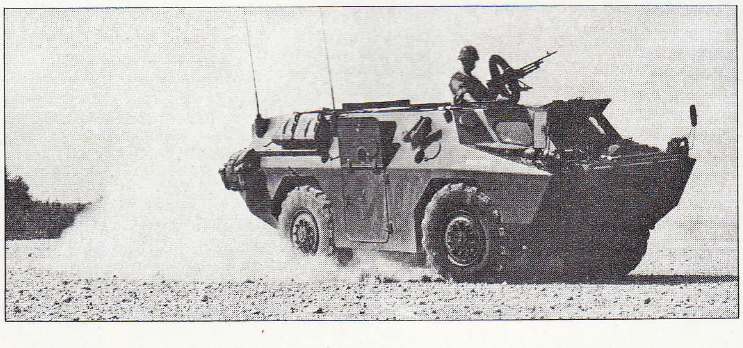
Below: A Renault VAB (4×4) vehicle used by the French army and fitted with the RATAC (Radar de Tir pour Artillerie de Campagne) radar on the roof. This can detect, identify, locate and automatically track a variety of ground targets, including armoured vehicles.



FRANCE

Berliet VXB-170 armoured personnel carrier

After World War II Berliet was a major supplier of trucks to the French army, and in the late 1960s designed and built the prototype of a wheeled APC called the **BL-12** which used a number of standard heavy duty commercial components. Further development of this resulted in the **VXB-170** which was subsequently adopted by the French Gendarmerie as well as Gabon and Senegal. In 1975 Berliet was taken over by the Renault group, who had by then already built prototypes of 4×4 and 6×6 vehicles to meet the French army VAB requirement. With the acceptance of the Renault/Saviem vehicle to meet this requirement, production and marketing of the VXB-170 ceased as there was no point in two parts of the same group producing vehicles of a



A Berliet VXB (4×4) armoured personnel carrier at speed with armoured shutters over the driver's windscreens in the open position. When in a combat zone these cover the windscreens, and the driver then sees the terrain ahead through three roof-mounted periscopes, replaceable from inside the vehicle.

similar nature.

The hull of the VXB-170 is of all-welded steel construction with a maximum thickness of 7 mm (0.27 in). The driver is seated at the front of the hull in the centre with a large windscreen to his front and a smaller one on each side. In an internal security situation these windscreens are covered by armoured flaps and the driver then observes the terrain ahead through three roof-mounted periscopes. The troops enter the vehicle through three doors, one in each side and the third in the hull rear on the right side. Hatches are provided in the roof, and as usual a wide range of armament installations could be fitted. The vehicles used by the French Gendarmerie have a small SAMM one-man turret armed with a 7.62-mm (0.3-in) machine-gun and a 40-mm grenade-launcher which can be elevated from −15° to +60°; the grenade-launcher is normally used to launch tear gas grenades to disperse crowds.

The engine compartment is at the rear of the vehicle on the right side, and the diesel engine is coupled to a pre-selective gearbox with six forward and one reverse gear and a two-speed transfer case. Steering is power-assisted to reduce driver fatigue, and the suspension consists of helical springs and hydraulic shock absorbers. The VXB-170 is fully amphibious, being propelled in the water by its wheels at a speed of 4 km/h (2.5 mph); waterjets were offered as an option, but as far as it is known these were never fitted to any production APCs. Vehicles used by the French Gendarmerie have a hydraulically-operated obstacle-clearing blade at the front of the hull, and optional equipment includes bullet-proof tyres, night-vision equipment, a winch and a heater.

Berliet offered three families of the VXB-170: one was for internal security use and the two others were the light reconnaissance vehicle and the light combat vehicle. These were offered with a wide range of weapon options including the Hispano-Suiza turret armed with twin 7.62-mm (0.3-in) machine-guns and a 60-mm breech/muzzle-loaded mortar, and the H-90 turret armed with a 90-mm (3.54-in) gun and a 7.62-mm (0.3-in) co-axial machine gun; both turrets were at that time standard for the Panhard AML-90 light armoured car.

Specification
VXB-170
Crew: 1+11
Combat weight: 12700 kg (27,997 lb)
Powerplant: one Berliet V 800 M V-8 diesel developing 170 hp (127 kW)
Dimensions: length 5.99 m (19 ft 8 in); width 2.50 m (8 ft 2.4 in); height without armament 2.05 m (6 ft 8.7 in)
Performance: maximum road speed 85 km/h (53 mph); maximum road range 750 km (466 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.3 m (1 ft 0 in); trench not applicable

Infantry armed with 9-mm MAT 49 sub-machine guns remount their Berliet VXB 170 (4×4) armoured personnel carrier while the 7.62-mm (0.3-in) machine-gunner prepares to give covering fire if required. The largest user of the VXB is the French Gendarmerie.

A Berliet VXB 170 (4×4) armoured personnel carrier with all roof hatches open. When the Berliet company was taken over by Renault the VXB family was phased out of production as the Renault VAB (4×4 and 6×6) series had more scope for further development.

FRANCE

Panhard VCR armoured personnel carrier

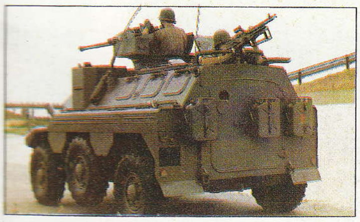
Following the success of its AML and M3 range of 4×4 armoured vehicles, Panhard went on to develop the ERC 6×6 armoured car and **VCR** 6×6 armoured personnel carrier, which share over 90 per cent common automotive components such as engine, transmission, suspension, steering and wheels. The first prototype of the VCR (*Véhicule de Combat à Roues*, or wheeled combat vehicle) was shown in 1977, the first production vehicles being completed just two years later. The VCR has been designed specifically for the export market, and known sales have been made to Argentina, Iraq and the United Arab Emirates.

The VCR has an all-welded hull which varies in thickness from 8 to 12 mm (0.315 to 0.47 in), the very front of the vehicle being almost identical with that of the Panhard M3 4×4 armoured personnel carrier. The driver is seated at the front with the engine to his right rear and the commander to his left rear. Both have a single-piece hatch cover and periscopes for observation. The troop compartment is at the rear and has twin doors in the hull rear, with roof hatches and firing/observation ports in the upper part. The main armament is normally mounted over the forward part of the troop compartment and can consist of a pintle-mounted 7.62-mm (0.3-in) or 12.7-mm (0.5-in) machine-gun, or a turret with similar weapons or a 20-mm cannon. An unusual feature of the VCR is its wheel arrangement as all six wheels are powered, with power-assisted steering on the front wheels only. When the VCR is travelling on roads, the centre road wheel on each side is normally raised off the ground. The VCR is fully amphibious, being propelled in the water by its wheels at a speed of 4 km/h (2.48 mph). Optional equipment includes an air-conditioning system, passive night-vision equipment, an NBC system and a front-mounted winch for self-recovery or assisting other vehicles.

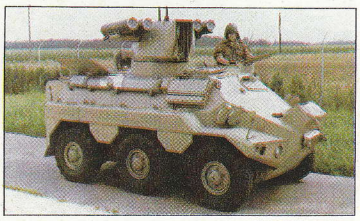
The first model to enter production was the **VCR/TH** anti-tank vehicle, of which 106 have been supplied to Iraq. This is fitted with the Euromissile UTM 800 turret with four HOT ATGWs in the ready-to-fire position and a further 10 missiles in the hull. Mounted over the rear part of the troop compartment is a remote-controlled 7.62-mm (0.3-in) machine-gun. This model has a crew of four and has been used in the fighting between Iraq and Iran. The ambulance version is the **VCR/IS**, and has a higher roof so the medical staff can stand up. This can carry six seated and two stretcher patients or four stretcher patients plus the three-man crew consisting of commander, driver and medical orderly. The ambulance version is known to have been supplied to the United Arab Emirates. The command post version is the **VCR/PC**, which has communications equipment and mapboards. The repair vehicle is the **VCR/AT**, fitted with a block and tackle for lifting out engines and other components; it carries a full range of spares and tools, but no winch.

There is also a 4×4 model of the VCR which has recently entered production for an undisclosed country, and this can be propelled in the water by two waterjets at a speed of 7.2 km/h (4.5 mph). For trials purposes one prototype of the VCR 4×4 has been fitted with the Euromissile Mephisto anti-tank system.

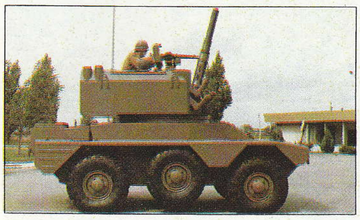
Specification
VCR
Crew: 3+9
Combat weight: 7000 kg (15,432 lb)
Powerplant: one Peugeot PRV V-6 petrol engine developing 155 hp (115.6 kW)
Dimensions: length 4.565 m (14 ft 11.7 in); width 2.495 m (8 ft 2.2 in); height without armament 2.03 m (6 ft 8 in)
Performance: maximum road speed 100 km/h (62 mph); maximum range 800 km (497 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.8 m (2 ft 7.5 in); trench 1.1 m (3 ft 7.3 in)



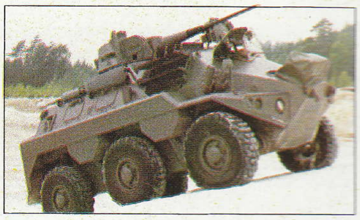
A standard Panhard VCR/TT armoured personnel carrier with a 20-mm cannon over the forward part of the troop compartment and a 7.62-mm (0.3-in) machine-gun at rear.



The Panhard VCR/TH anti-tank vehicle is fitted with a Euromissile UTM-800 one-man turret armed with four Euromissile HOT long-range anti-tank weapons.



The Panhard ENC 81-mm mortar gun carrier is a member of the ERC range of armoured cars which shares common components with the VCR range of APCs.



This Panhard VCR/TT armoured personnel carrier is fitted with a one-man turret armed with a 20-mm cannon. All VCRs are fully amphibious without preparation.

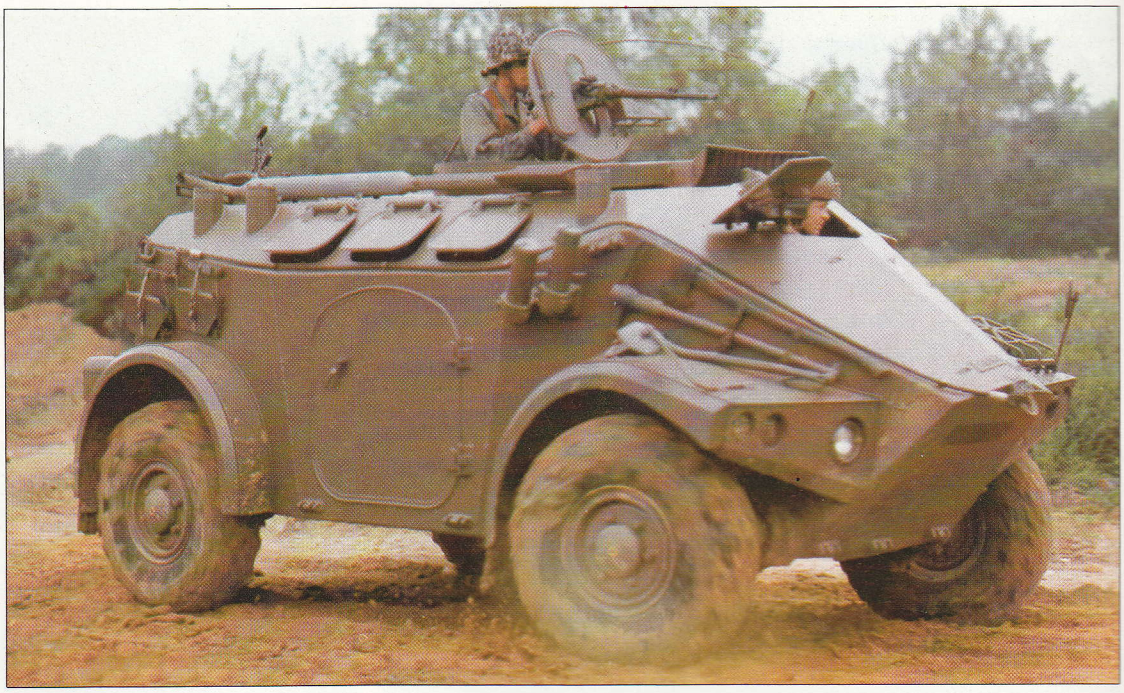
FRANCE

Panhard M3 armoured personnel carrier

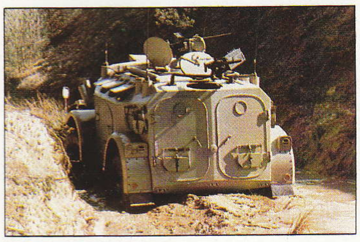
The **M3** armoured personnel carrier was designed as a private venture by Panhard, and the first production vehicles were completed in 1971. The vehicle uses 95 per cent common automotive components with the Panhard AML armoured car, of which some 4,000 have now been built by Panhard or manufactured under licence in South Africa by Sandock-Austral. This enables a country to purchase a fleet of armoured cars and personnel carriers which share the same components, permitting significant savings in training and spare parts holdings. Over 25 countries have now purchased the vehicle, some for army use and some for police use. For example, Algeria has recently taken delivery of 44 vehicles for its *gendarmerie* fitted with a one-man turret armed with a machine-gun. It also has the VPC, VAT, VLA and VTS variants (see below) in service.

The hull of the M3 is of all-welded steel armour construction which varies in thickness from 8 to 11 mm (0.315 to 0.43 in). The driver is seated at the front of the hull, with the engine to his immediate rear. The engine is coupled to a manual gearbox with six forward and one reverse gear, and power is transmitted to the four road wheels by drive shafts that run inside the hull. The troop compartment is at the rear of the hull, a single door being provided in each side of the hull and twin doors in the hull rear. In the upper part of the hull side, which slopes inwards, are three hatches hinged at the top, these enabling troops to use their small arms from within the vehicle. The main armament is normally mounted in the roof to the rear of the engine compartment, this armament ranging from a turret with single or twin 7.62-mm (0.3-in) machine-guns to a power-operated turret with a 20-mm cannon. Over the rear of the troop compartment is a small hatch on which is normally installed a rail mount with a 7.62-mm (0.3-in) machine-gun.

The M3 is fully amphibious, being propelled in the water by its wheels at a speed of 4 km/h (2.48 mph), but it can only operate in lakes and rivers with a slow current. Many vehicles are fitted with channels which can be quickly removed and placed in front of the vehicle to allow it to cross ditches and other battlefield obstacles. If required, the M3 can be fitted with passive night-vision equipment for the driver, an air-conditioning system (essential in the Middle East) and smoke dischargers. The basic M3 has also been adopted for a number of more specialized roles.



This Panhard M3 armoured personnel carrier has the driver's hatch open and is fitted with a Creusot-Loire STB shield with a 7.62-mm (0.3-in) machine-gun. Designed as a private venture, the M3 has been purchased by more than 25 countries, with more than 4000 vehicles in service.



A standard Panhard M3 armoured personnel carrier showing rear troop doors and a roof-mounted 7.62-mm (0.3-in) machine-gun. All M3s are fully amphibious.

The anti-aircraft member of the family is called the M3 VDA and is fitted with a one-man turret armed with twin 20-mm cannon.

This Panhard M3 is used in the fire support role and is fitted with a Brandt Type HB 60-mm breech/ muzzle loaded mortar in a special mount.

The anti-aircraft model is called the **M3 VDA** and is fitted with a power-operated turret armed with twin 20-mm cannon. The **M3 VAT** repair vehicle has a full range of tools and is fitted with a jib for lifting engines in the field. The **M3 VPC** command vehicle has extensive communications equipment. The ambulance model of the family is called the **M3 VTS** and is unarmed. The engineer vehicle version is the **M3 VLA**, and is fitted with a hydraulically-operated dozer blade at the front of the hull for clearing obstacles.

Specification
M3

Crew: 2+10

Combat weight: 6100 kg (13,448 lb)

Powerplant: one Panhard Model 4 HD 4-cylinder petrol engine developing 90 hp (67 kW)

Dimensions: length 4.45 m (14 ft 7.2 in); width 2.40 m (7 ft 10.5 in); height without armament 2.00 m (6 ft 6.7 in)

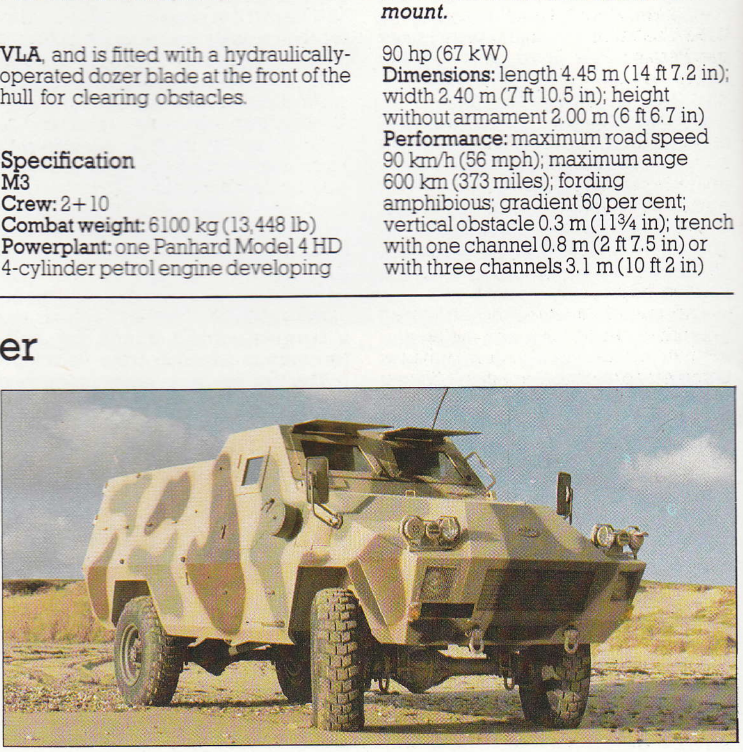
Performance: maximum road speed 90 km/h (56 mph); maximum ange 600 km (373 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.3 m (11¾ in); trench with one channel 0.8 m (2 ft 7.5 in) or with three channels 3.1 m (10 ft 2 in)

FRANCE

ACMAT armoured personnel carrier

For well over 25 years the Ateliers de Construction Mécanique de l'Atlantique (ACMAT) have been building a wide range of 4×4 and 6×6 cross-country trucks which have exceptional range and durability. These have been sold to more than 30 countries in Africa, the Middle East and the Far East. The company also realized that there was a market for an armoured personnel carrier on the same chassis and has therefore recently introduced the **TPK 4.20 VSC**, which is now in service with a number of countries including Gabon and the Ivory Coast.

The layout of the TPK 4.20 VSC is similar to that of a truck, with the engine at the front, commander and driver in the centre and the troop compartment at the rear. The commander and driver each have a windscreen to their front which can be quickly covered by an armoured shutter, a side door with a bullet-proof window in its upper part, and a single-piece hatch cover above their position.



An ACMAT VSC armoured personnel carrier with an open-topped troop compartment, in which can be mounted an 81-mm mortar or other types of weapons. The ACMAT armoured vehicles have exceptional range and durability.

The troops are seated on bench seats down each side of the vehicle, and can exit quickly through the two doors in the hull rear. If required, firing ports and/or vision blocks can be provided in the sides and rear of the troop compartment, and a 7.62-mm (0.3-in) or 12.7-mm (0.5-in) machine-gun turret can be mounted on the roof of the vehicle to give covering fire while the infantry dismount from the vehicle. Another model of the vehicle has an open-topped rear troop compartment with sides that can quickly folded down on the outside.

The well proven Perkins six-cylinder diesel engine is coupled to a manual gearbox with four forward and one reverse gear and a two-speed transfer case. Steering is of the worm and nut type, and the exceptional operating range of 1600 km (994 miles) results from the large-capacity fuel tank, which holds 370 litres (81.4 Imp gal). A spare wheel and tyre is normally carried on the wall to the immediate rear of the commander's and driver's position. Optional equipment includes an air-conditioning system, essential in many parts of the world if the infantry are to arrive at their objective in any condition to fight, and different radio systems. Other armament options include a Euromissile MILAN ATGW system with additional missiles carried internally in the troop compartment, and an 81-mm Brandt mortar firing to the rear. In most infantry battalions six or eight mortars are normally issued to provide immediate and close-range support for the infantry. Artillery support is normally not organic to an infantry battalion, although for some missions (for example a long-range patrol in North Africa by a battalion of infantry in ACMAT trucks), it would often have a battery of four 105-mm (4.13-in) howitzers towed by similar vehicles.

Specification

TPK 4.20 VSC

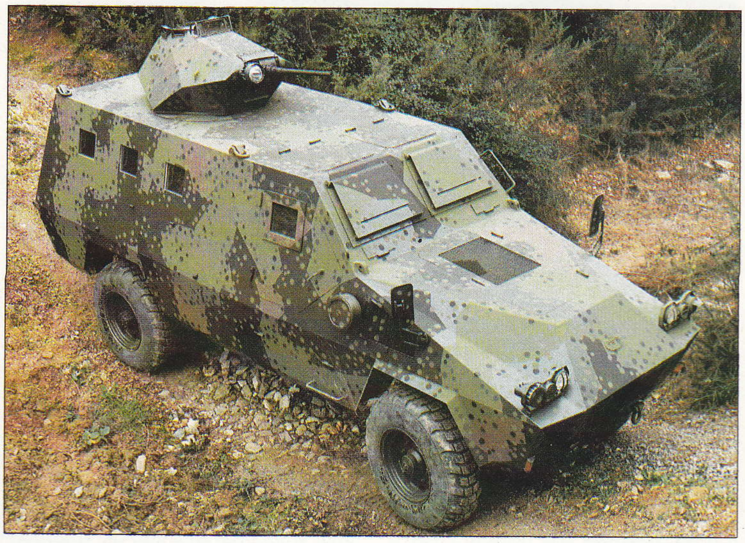
Crew: 2+8

Combat weight: 7300 kg (16,094 lb)

Powerplant: one Perkins Model 6.354.4 6-cylinder diesel developing 125 hp (93 kW)

Dimensions: length 5.98 m (19 ft 7.4 in); width 2.07 m (6 ft 9.5 in); height 2.21 m (7 ft 3 in)

Performance: maximum road speed 95 km/h (59 mph); maximum range 1600 km (994 miles); fording 0.8 m (2 ft 7.5 in); gradient 60 per cent; trench not applicable



An ACMAT VBL light armoured car with all hatches closed and fitted with a one-man Creusot-Loire turret armed with one machine-gun.

SPAIN

BMR-600 infantry fighting vehicle

In the early 1970s the Spanish army issued a requirement for a 6×6 infantry fighting vehicle which was subsequently developed by ENASA and the Spanish army under the designation **Pegaso 3.500**, later **BMR-600** (*Blindado Medio de Ruedas*, or wheeled medium armoured vehicle). This was tested alongside the Swiss MOWAG Piranha 6×6 and French Renault VAB 6×6 vehicles, and accepted for service against a total requirement for at least 500. The company have now developed a complete family of vehicles using the same basic chassis, namely the **Pegaso 3560/1** armoured personnel carrier, the **Pegaso 3560/3** 81-mm mortar carrier, the **Pegaso 3560/4** 120-mm mortar towing vehicle, the **Pegaso 3560/5** battalion command vehicle and the **Pegaso 3564** fire-support vehicle which can be fitted with a variety of turrets such as the French TS-90 two-man turret armed with a 90-mm (3.54-in) gun. The **Pegaso 3562 VEC** cavalry scout vehicle has a brand new hull but uses the same automotive components as the basic infantry fighting vehicle, and is fitted with a two-man power-operated turret armed with a 20-mm or 25-mm cannon; this model is already in service with the Spanish army.

The hull of the BMR-600 armoured personnel carrier is of all-welded aluminium construction which provides complete protection against 7.62-mm (0.3-in) armour-piercing rounds over the frontal arc and 7.62-mm (0.3-in) ball over the remainder of the vehicle. The driver is seated at the front of the vehicle on the left with the machine-gunner/radio operator to his rear and the engine compartment to their right. The troop compartment is at the rear of the hull, and has accommodation for 11 fully equipped troops who enter and leave the vehicle through a power-operated ramp in the hull rear. Depending on the model, firing ports and/or vision blocks are provided in the troop compartment to allow the troops to fire their weapons from within the vehicle. The main armament normally comprises a 7.62-mm (0.3-in) externally-mounted machine-gun, although other weapon stations can be fitted.

The vehicle is fully amphibious, and if required can be delivered with waterjets which give it a maximum water speed of 10 km/h (6.2 mph). Steering is powered to reduce driver fatigue, and is unusual in that it is on both the front and rear axles. The engine is coupled to an automatic transmission with six forward and one reverse gear, torque converter and hydraulic retarder.

Vehicles used by the Spanish army have a machine-gun with an elevation of +60° and a depression of −15° in a turret capable of 360° traverse. Some 2,500 rounds of ammunition are carried for this weapon. For trials purposes a BMR-600 has been fitted with the Euromissile HCT turret with four HOT wire-guided anti-tank missiles in the ready-to-launch position, additional missiles being carried in reserve. An anti-aircraft version with a 20-mm Meroka cannon or missiles is also being proposed.

Specification

BMR-600

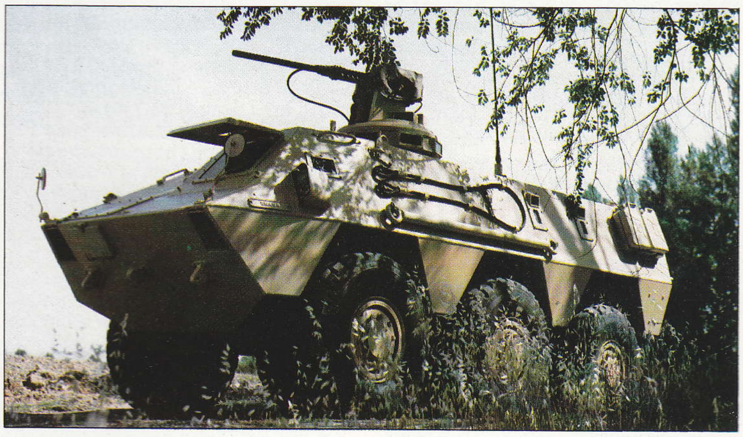
Crew: 2+11

Combat weight: 13750 kg (30,313 lb)

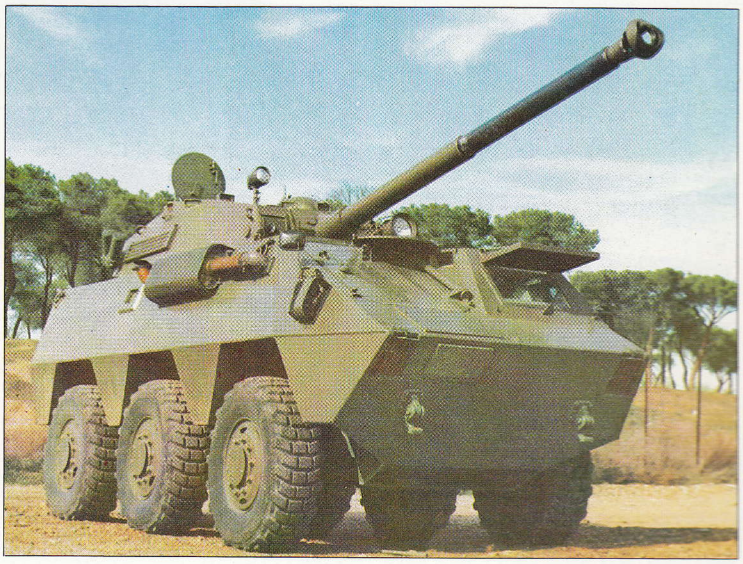
Powerplant: one Pegaso 9157/8 6-cylinder diesel developing 306 hp (228 kW)

Dimensions: length 6.15 m (20 ft 2.1 in); width 2.50 m (8 ft 2.4 in); height to hull top 2.00 m (6 ft 6.7 in)

Performance: maximum road speed 100 km/h (62 mph); maximum range 700 km (435 miles); fording amphibious; gradient 68 per cent; vertical obstacle 0.8 m (2 ft 7.5 in); trench 1.2 m (3 ft 11.2 in)



A BMR-600 infantry fighting vehicle as used by the Spanish army and fitted with a one-man turret armed with a remote-controlled 12.7-mm (0.5-in) M2 HB machine-gun. An unusual feature of this vehicle is that both the front and rear axles can be steered and the suspension adjusted to suit the type of terrain being crossed.



A BMR-600 used in the fire support and anti-tank role, and fitted with the French GIAT TS-90 turret armed with the long-barrelled 90-mm gun which can fire a wide range of fixed ammunition, including APFSDS.

SPAIN

BLR-600 armoured personnel carrier

The **BLR-600** (*Blindado Ligero de Ruedas*, or wheeled light armoured vehicle) is one of two armoured vehicles of the wheeled type currently being produced by Empresa Nacional de Autocamiones, the other being the BMR-600 6×6 infantry fighting vehicle. The BLR 4×4 vehicle is designed mainly for internal security operations, however, and is used in this role by the Spanish army and Spanish civil guard. Many of the automotive components are taken from standard commercial vehicles already in production.

The layout of the BLR is unusual, the commander and driver being seated at the front of the vehicle with excellent observation to the front and sides, a essential requirement for an internal security vehicle. The 12 fully equipped men are seated to the rear of the commander and driver and along the sides of the hull at the rear. The engine, coupled to an automatic transmission with torque converter and transfer case, is in the centre of the hull at the rear. No less than four doors are provided, one in each side and two in the rear, so that in the event of an ambush the troops quickly leave the vehicle through at least one of the doors. There are four hatches in the roof in addition to a cupola located on the forward part of the roof and armed with a 7.62-mm (0.3-in) machine-gun, with a shield to protect the gunner from enemy small arms fire. Depending on the actual model, firing ports and/or vision blocks are provided in the sides and rear of the troop compartment to allow the men to fire their weapons from within the vehicle.

The basic BLR is fitted with a six-cylinder water-cooled diesel developing 220 hp (164 kW), but the type is also available powered by a diesel engine developing only 170 hp (127 kW).

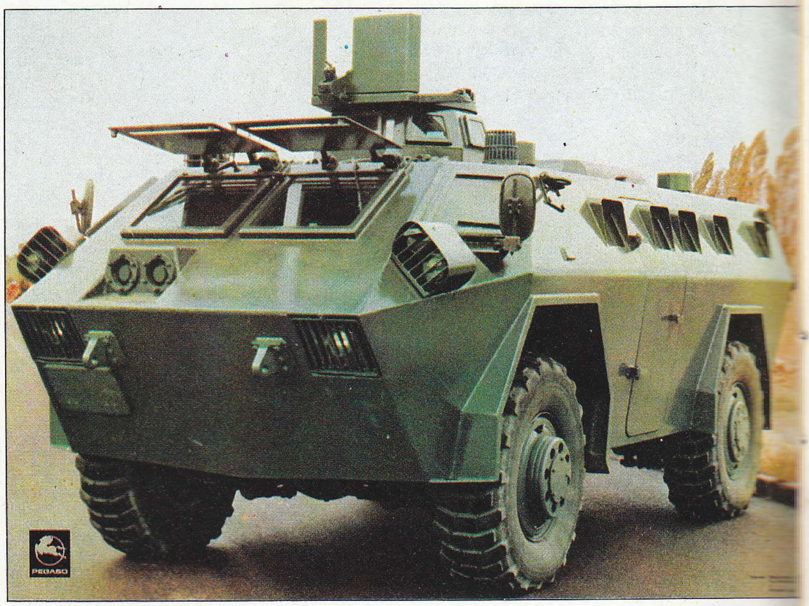
In many riot situations, petrol bombs are thrown at the internal security vehicles, and in addition to being fitted with the normal fire-suppression system in its engine compartment, the BLR has in each of the four road wheels hub outlets for fire suppressant in case the tyres catch fire. The tyres are fitted with puncture-proof Hutchinson O-rings. The commander's and driver's windows can be quickly covered by shutters, and each is provided with a standard water washer and another one filled with solvent to deal with paint or other liquids on the windscreens.

In addition to the less powerful engine already mentioned, the BLR can also be fitted with a wide range of optional equipment including a manual transmission in place of the automatic transmission, CS gas dischargers, loudspeakers (also essential in IS operations to warn crowds to disperse), power-take-off and so on.

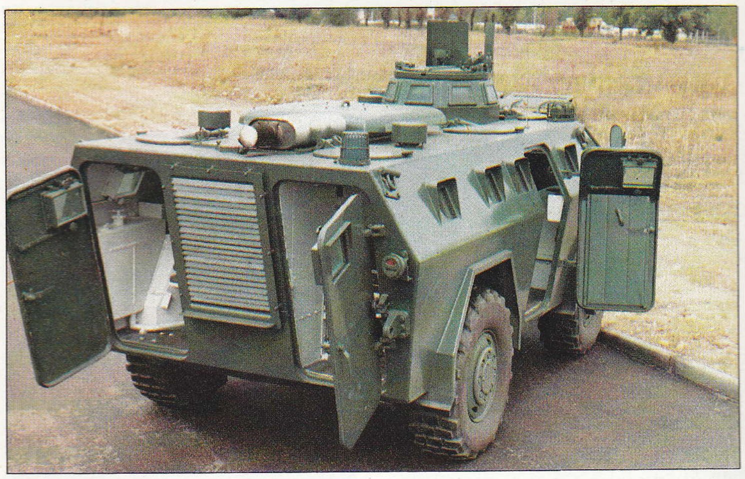
More recently Empresa Nacional Santa Barbara, Macosa and Land Rover Santana have developed the **BMU-2** armoured personnel carrier based on a long wheel base Land Rover chassis which is made in Spain by Land Rover Santana. This can carry six men including the driver and can be fitted with light weapons, although the manufacturer has suggested that it could also be fitted with a 106-mm (4.17-in) M40 series recoilless rifle for use in the anti-tank role.

Specification

BLR-600
Crew: 3+12
Combat weight: 11600 kg (25,574 lb)
Powerplant: one Pegaso 9220 6-cylinder diesel developing 220 hp (164 kW)
Dimensions: length 5.65 m (18 ft 6.4 in); width 2.5 m (8 ft 2.4 in); height without armament 1.99 m (6 ft 6.3 in)
Performance: maximum road speed 86 km/h (53.4 mph); maximum range 800 km (497 miles); fording 1.1 m (3 ft 7.3 in); gradient 75 per cent; vertical obstacle 0.6 m (1 ft 11.6 in); trench not applicable



A BLR (4×4) armoured personnel carrier from the rear with all of its doors in the open position. The large number of doors and hatches allows the 12 troops carried to quickly leave the vehicle in the event of an ambush. Firing ports and vision blocks are fitted.



The BLR (Blindado Ligero de Ruedas) was designed by Empresa Nacional de Autocamiones (who also build the BMR-600 IFV) mainly for use in the internal security role. It is now used by the Spanish army and Civil Guard. Armament normally comprises a 7.62-mm (0.3-in) or 12.7-mm (0.5-in) machine-gun.

SOUTH AFRICA

Ratel 20 infantry fighting vehicles

For many years the British-supplied Alvis Saracen 6×6 armoured personnel carrier was the standard vehicle of its type in the South African army. When it became apparent that future supplies of armoured vehicles and their all-essential spare parts were in some doubt, the South Africans decided to build a new vehicle to meet their own requirements. Then as now, Sandock-Austral was building a modified version of the Panhard AML 4×4 light armoured car for the South African army under the name Eland, and the task of designing and building the new vehicle was given to this company. The first prototype was completed in 1976, the first production vehicles being completed just two years later, a remarkable achievement by any standards. Since then some 1,000 examples of the **Ratel** have been built for the home market and for export to Morocco. The South African army used the type operationally for the first time in Operation 'Reindeer' in May 1978, and since then Ratels have been used on many of the deep strikes into Angola, where the type's large operating range has proved to be very useful. The Moroccans have used them against the Polisario guerrillas in the Sahara desert.

The basic vehicle is called the **Ratel 20** and carries a total of 11 men in the form of the commander and gunner in the turret, the driver at the front, the anti-aircraft machine-gunner at the rear and seven fully equipped infantry. The two-man turret is armed with a French-designed 20-mm dual-feed cannon and co-axial 7.62-mm (0.3-in) machine-gun, a similar weapon being located on the turret roof for anti-aircraft defence. Mounted on each side of the turret are two smoke-dischargers, and there is a 7.62-mm (0.3-in) anti-aircraft machine-gun at the right rear of the hull roof. The **Ratel 60** has a similar crew, but has a two-man turret armed with a 60-mm breech-loaded mortar, a 7.62-mm (0.3-in) co-axial and a 7.62-mm (0.3-in) anti-aircraft machine-gun. The **Ratel 90** is the fire-support vehicle and has a two-man turret armed with the same 90-mm (3.54-in) gun as fitted to the Eland light armoured car, together with a 7.62-mm (0.3-in) co-axial and 7.62-mm (0.3-in) anti-aircraft machine-gun. Some 69 rounds of 90-mm (3.54-in) ammunition are carried, 29 in the turret and 40 in the hull, these being of the HEAT (high explosive anti-tank) or HE (high explosive) types. The command member of the family has a nine-man crew consisting of the commander, driver, main gunner and six command staff, and is armed with a turret-mounted 12.7-mm (0.5-in) M2 HB machine-gun and two 7.62-mm (0.3-in) anti-aircraft machine-guns. This variant has map boards, a pneumatically-operated mast, intercom, internal loudspeakers, public address system and three radios for communication with other vehicles and higher command staff.

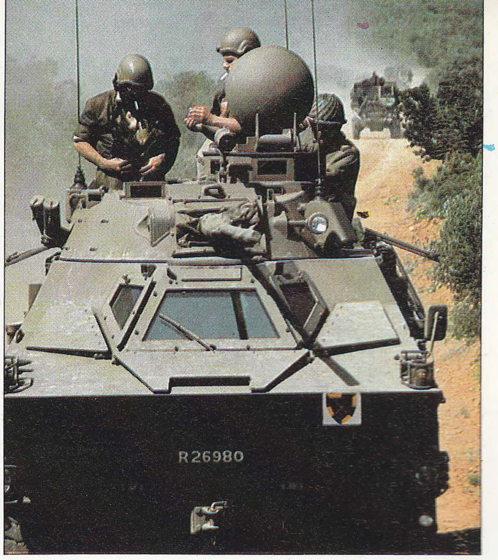
More recently Sandock-Austral has built the prototype of the Ratel 8×8 logistic support vehicle, one of which is designed to support three or four Ratel vehicles operating well away from their main base. It has a three-man crew and can carry nine containers each of which carries a specific cargo such as ammunition, food, water, tents and even showers. Fuel tanks in the hull hold 2000 litres (440 Imp gal) of fuel, which can be transferred to other vehicles by onboard pumps.

Specification

Ratel 20
Crew: 11
Combat weight: 19000 kg (41,888 lb)
Powerplant: one Model D 3256 BTXF 6-cylinder diesel developing 282 hp (210 kW)
Dimensions: length 7.212 m (23 ft 8 in); width 2.516 m (8 ft 3 in); height overall 2.915 m (9 ft 6.8 in)
Performance: maximum road speed 105 km/h (65 mph); maximum range 1000 km (621 miles); fording 1.2 m (3 ft 11.2 in); gradient 60 per cent; vertical obstacle 0.35 m (1 ft 1.7 in); trench 1.15 m (3 ft 9.3 in)

Ratel Infantry Fighting Vehicle in Action

The difficult conditions forced upon South Africa by the long struggle in Namibia has led to the development of a number of weapons suited to the terrain and climate. The Ratel APC has been amongst the most successful of these introductions.



A Ratel 20 with a 20-mm cannon, covered to protect it while in transit against the dust which gets into every weapon. Unless the weapons are regularly cleaned they will not function at all.

The Ratel infantry fighting vehicle has been designed specifically to meet the requirements of the South African infantry corps and at a later date was also adopted by the South African armoured corps. In the former it has now replaced the British-supplied Alvis Saracen 6×6 armoured personnel carrier as it has much improved armour protection, mobility and fire power. The Saracen is armed with a turret-mounted 7.62-mm (0.3-in) machine-gun, a similar weapon being pintle-mounted at the rear for the anti-aircraft role; it is also powered by a petrol engine, whose 200-litre (44-Imp gal) fuel tank provides a range of 399 km (248 miles). The range of the Saracen is adequate for operations in Europe, but came nowhere near meeting the future requirements of the South African army. Its lack of firepower also meant that it had to be supported by another vehicle such as an Eland armoured car.

The Ratel family includes versions armed with 90-mm (3.54-in) guns, 20-mm cannon and 60-mm breech-loaded mortars, plus the usual command and support vehicles, all of which use the same basic hull. The Ratel series has an exceptional range of 1000 km (621 miles) which means the vehicles have often undertaken a complete mission into Angola and back without refuelling, although they are normally topped up with fuel whenever possible.

For some time the South African forces in South West Africa (Namibia) had been on the defensive against the SWAPO guerrillas infiltrating from southern Angola, but in May 1978 the South African army, heavily supported by the South African air force, struck back across the border in Operation 'Reindeer' designed to destroy SWAPO bases and kill as many guerrillas as possible. This operation was considered to be a major operational success, although many countries denounced South Africa for striking deep into Angola.

By early 1980 things were going badly for SWAPO, which had lost large numbers of men and equipment, was short of food and faced with the prospect of increasingly numerous desertions. SWAPO's popularity had started to decline not only amongst its own followers but also with its main supporters, and the command staff realized that action had to be taken to restore SWAPO's credibility. SWAPO units were transferred from the eastern part of the country to the western part. The South African defence forces soon got wind that a major offensive would be launched into the area of the South West Africa Command, and the general officer commanding soon obtained permission to mount a pre-emptive strike against SWAPO targets in south west Angola. The aims of this operation, subsequently given

A Ratel 20 infantry fighting vehicle at speed in Namibia. This model has an 11-man crew and is fitted with a two-man turret armed with a French 20-mm cannon and a co-axial 7.62-mm (0.3-in) MG.

The Ratel 90 Fire Support Vehicle is fitted with a two-man turret armed with the same 90-mm gun as fitted to the Eland 90 (4×4) armoured car, which is also used by the South African Army.

The Ratel 20 has a two-man turret armed with a French-built GIAT 20-mm F2 cannon. The vehicle carries some 1200 rounds of South African-made ammunition in addition to its crew of 11.

the name 'Sceptic', were both military and political. The military aim was to wipe out SWAPO bases and guerrillas, and to capture or destroy as much ammunition, food and other equipment as possible; the political aims were to improve the confidence of the people of South West Africa and the defence forces, while destroying the confidence of SWAPO and its Communist backers. The South African high command in Pretoria made it clear that no Angolan army units were to be engaged unless these attacked South African units. It was originally expected that the operation would start late in July, but as more information on the intentions and positions of SWAPO units came in the date was advanced.

SWAPO command

The SWAPO command centre for the whole area was near Chifufua and commonly known as Smokeshell by the planning staff, this being about 180 km (112 miles) inside Angola. The original SWAPO bases were well laid out and easily identified from the air and in 1978 had proved easy to destroy with air and artillery strikes. SWAPO had soon learned of its earlier mistakes and Chifufua was spread out over an area of 40 to 50 km^2 (15.4 to 19.3 sq miles), all the buildings being underground; there were not even any parade grounds. In all there were more than a dozen sub-bases within the area, each of them holding anything from 20 to 150 guerrillas; the whole area held about 800 men. South of Chifufua there were a further two SWAPO complexes at Mulola and Chitumba, with a third but smaller base to the east of Ionde.

The final South African plan called for the 54th Battalion and two companies of the 32nd Battalion, plus a parachute company and supporting unts, to advance from the east. The main force would consist of three battle groups, which would advance northwards from Eenhana: the 53rd Battle Group would then swing west to attack Chitumba, the 10th Battle Group would continue north and then swing west to attack Muola, while the 61st Battle Group would continue north and hit Chifufua and then continue north before swinging round to the south again to attack Ionde, which for this operation was given the codename Water Craft. Although the main target was only 180 km (112 miles) from the border, the actual distance travelled by the units once they reached the border was some 260 km (162 miles) as the terrain was bad. In addition, all the units had to travel some distance before they even reached the border.

Throughout May the various units carried out intensive training, not only in such things as fire co-ordination and tactics but also in the recovery of vehicles that had become bogged down in the sand. The latter training was to come in very useful in the following month. Leading elements started to move out on 7 June, and early on the following day the main task force started to assemble. The task force was composed of Eland 4×4 light armoured cars with 90-mm (3.54-in) guns or 60-mm breech-loaded mortars, all versions of the Ratel 6×6 infantry fighting vehicle, Buffel troop carriers (these have an open roof and also carried the mortar teams), 140-mm (5.5-in) field guns towed by their massive SAMIL 6×6 trucks, and large numbers of SAMIL 4×4 and 6×6 trucks carrying the essential supplies (ammunition, fuel and food) required by forces operating away from their main base.

Right: The Ratel 90 Fire Support Vehicle in action. The 90-mm gun can fire HEAT (High Explosive Anti-Tank), HE (High Explosive) and practice rounds, with the HE round being the most often used to date. A total of 69 rounds of 90-mm ammunition are carried. It also has two or three 7.62-mm (0.3-in) MGs.

The task force finally moved off towards the border and spent the night near Eenhana, and at 07.00 on the next morning headed north across the border. The terrain reduced the speed to that of the slowest vehicles, normally the 4×4 trucks, the Elands and the SAMILs towing the 140-mm (5.5-in) guns, and soon the task force started to fall behind schedule. The landscape in southern Angola is featureless and navigation is very difficult even under ideal conditions, and on more than one occasion the task force had to be redirected by light aircraft as it was heading the wrong way.

Combined attack

In the end the lost time was made up, and all units reached their individual positions in time for the main attack which was to take place on 10 June, although it later transpired that some of the units were not in fact in the correct positions. The basic idea was that combat teams would be allocated certain of the complexes to attack and afterwards form up again to attack Ionde. Before the attack by the Ratels, Smokeshell was to be attacked from 08.00 to about 11.00 by waves of Dassault Mirage, BAe Canberra and BAe Buccaneer aircraft of the South African air force, followed by a pounding by four 140-mm (5.5-in) guns for another hour.

The Ratel 20s and Ratel 60s had been used in combat before, but the Ratel 90, basically a Ratel with the same turret and 90-mm (3.54-in) gun of the Eland armoured car, was being used for the first time and proved to be highly successful as it could be deployed in both the anti-tank and fire-support roles. Each Ratel charged into the attack firing at anything that moved, its infantry remaining embarked to engage the SWAPO guerrillas with their 7.62-mm (0.3-in) assault rifles through the firing ports in the Ratel's sides. At least one trooper had his weapon smashed to pieces as his Ratel ploughed through the dense bush. Some troops opened up the roof hatches to enable them to fire down into the SWAPO trenches. The air was thick with the thump from the 90-mm (3.54-in) guns and bursts of 20-mm and 7.62-mm (0.3-in) fire. Platoon 2 was tasked to clear a field in which there was known to be a 14.5-mm (0.57-in) ZPU-1 anti-aircraft gun used in both this and the ground roles. However, as the Ratels attacked in line ahead four guns opened up on

Left: The Ratel infantry fighting vehicle is provided with firing ports and vision blocks in the sides of the troop compartment, and these are used during sweeps through guerrilla camps. In some cases, however, the infantry have to dismount and fight on foot.

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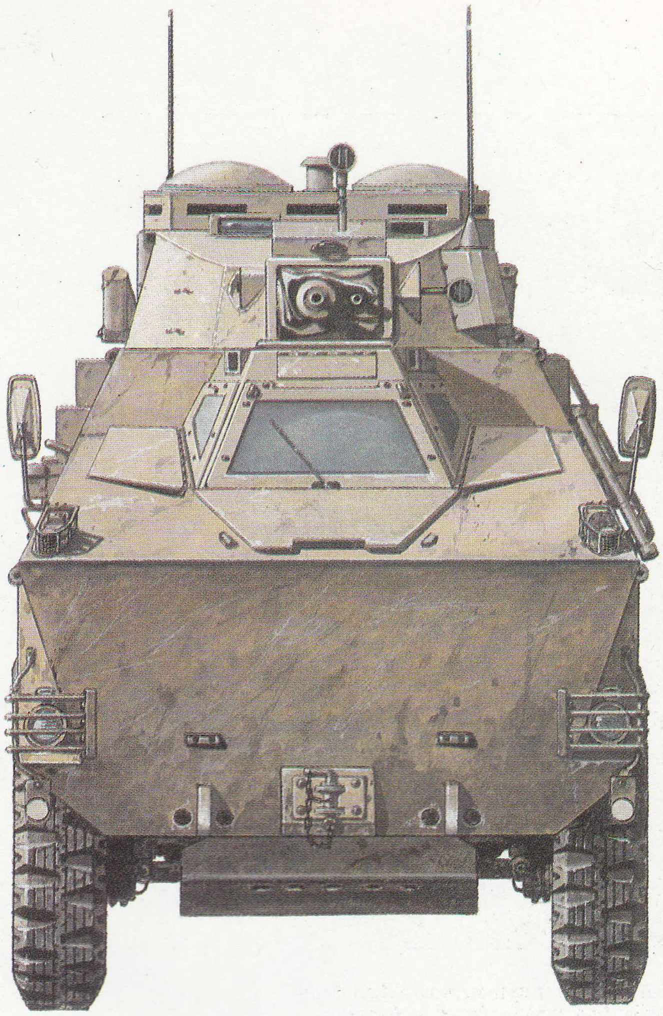
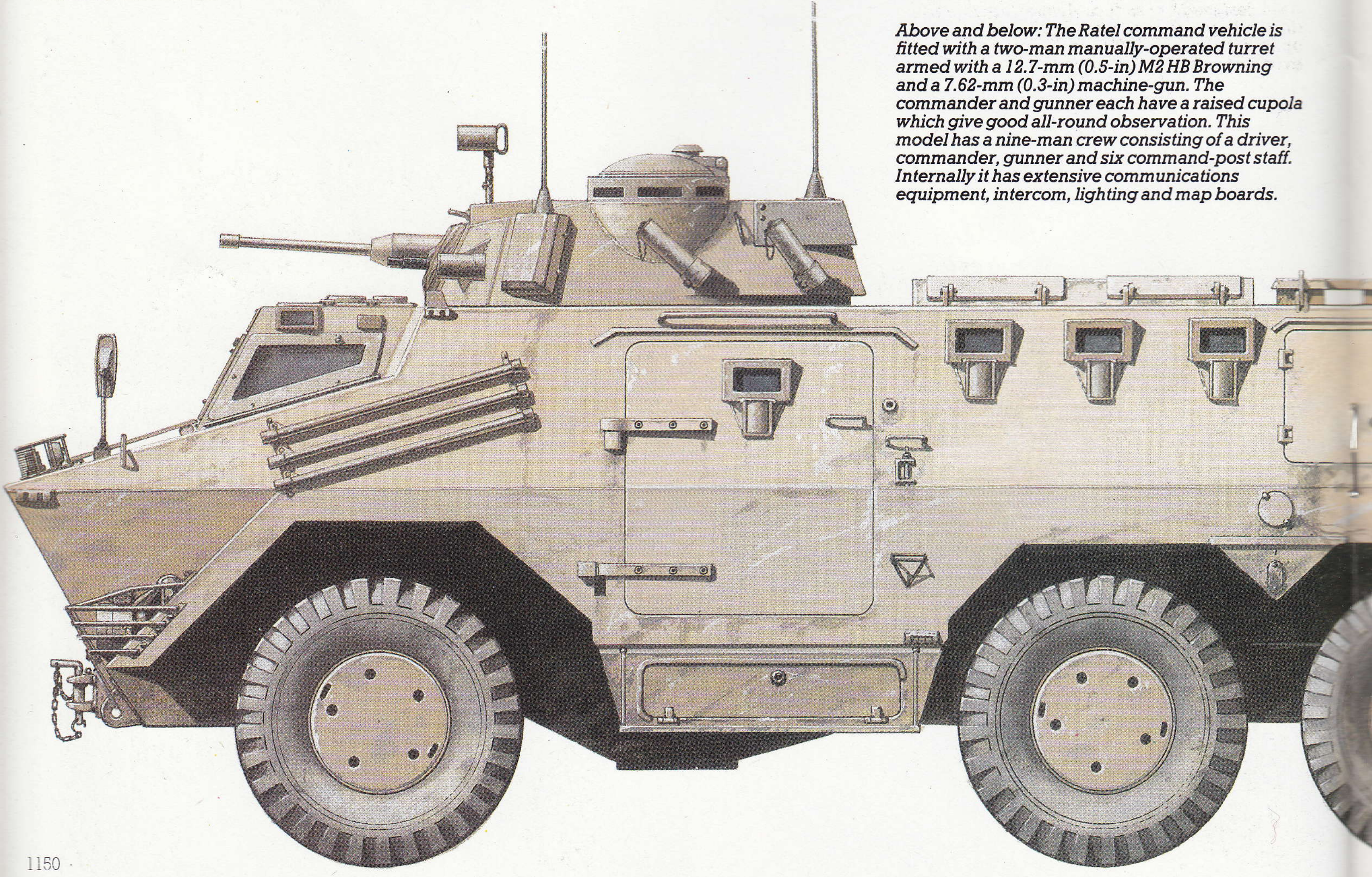
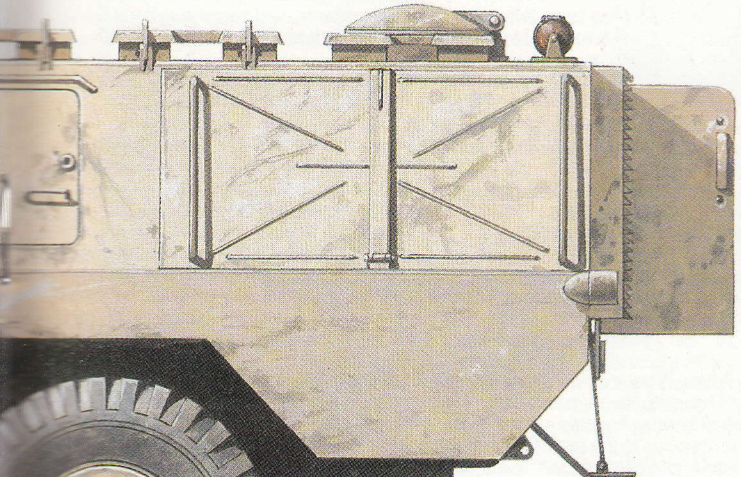
the Ratels, one of them a twin 23-mm ZU-23 anti-aircraft gun. At the end of the charge there remained only one Ratel, the one that knocked out the first 14.5-mm (0.57-in) weapon. The second Ratel almost made it, but was finally shot up by the second 14.5-mm (0.57-in) weapon whose armour-piercing rounds penetrated the rear of the vehicle, where a grenade went off and started a chain reaction in the other ammunition. One man was killed instantly, more being killed as they quickly left the vehicle. The third Ratel was hit by the 23-mm weapon and swung out of control with the driver dead at his controls. The fourth Ratel successfully knocked out a 14.5-mm (0.57-mm) gun but was then engaged by the 23-mm weapon which ripped the vehicle apart, killing almost half the crew. The survivors quickly removed their wounded comrades from the Ratels and set up defensive positions until other units could come to their aid. Ratels from other sections had become stuck as they fell through the roofs of the SWAPO underground bunkers and often the infantry had to dismount from their vehicles to winkle out the defenders one by one. At the end of the operation all of the Ratels returned to South West Africa, even the one which caught fire when the ammunition went off. This vehicle was a burnt-out hulk, and in the end the mechanics cut the Ratel in half and brought it back in two pieces as it is the policy of the South African defence forces to leave nothing behind at all. Many Ratels broke axles (especially the front ones) while others had engines and transmissions replaced in the field. Some lighter vehicles were even repaired while on tow as no men could be spared to guard vehicles left behind.

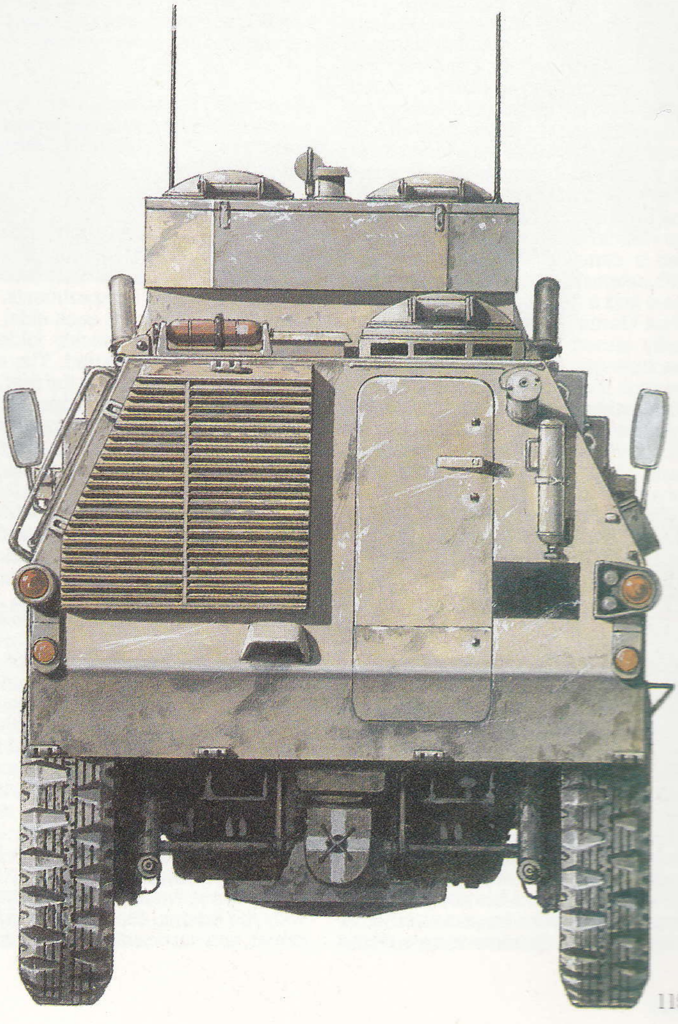




Above and below: The Ratel command vehicle is fitted with a two-man manually-operated turret armed with a 12.7-mm (0.5-in) M2 HB Browning and a 7.62-mm (0.3-in) machine-gun. The commander and gunner each have a raised cupola which give good all-round observation. This model has a nine-man crew consisting of a driver, commander, gunner and six command-post staff. Internally it has extensive communications equipment, intercom, lighting and map boards.

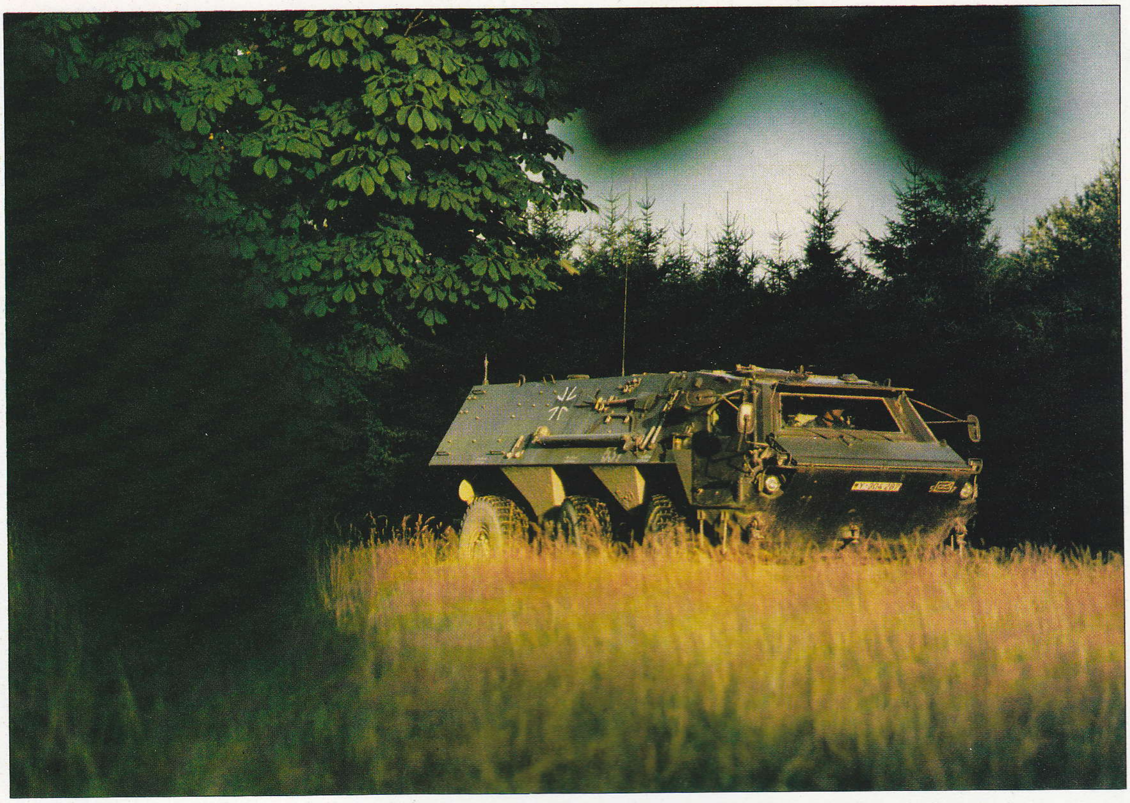
Above: South African infantrymen mount their Ratel (6×6) infantry fighting vehicle. The vehicle has been designed by Sandock-Austral to meet very demanding requirements, including an operational range of 1000 km (621 miles) and excellent cross-country mobility.



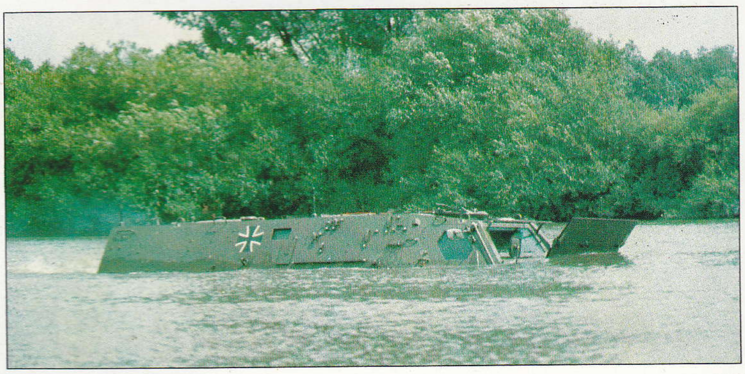


WEST GERMANY

Transportpanzer 1 armoured personnel carrier



Above: Thyssen-Henschel of Kassel are now building 996 Transportpanzer 1 (6×6) Fuchs amphibious vehicles for the West German army, which will be used in a wide range of roles including that of NBC reconnaissance vehicle, load carrier and engineer vehicle.



Right: The Transportpanzer 1 is fully amphibious, being driven through water at up to 10.5 km/h (6.5 mph) by twin propellers.

In the mid-1960s the West German army decided to develop a complete new range of vehicles sharing many common components; the range included 4×4, 6×6 and 8×8 trucks, an 8×8 armoured reconnaissance vehicle and 4×4 and 6×6 armoured personnel carriers. The 8×8 armoured reconnaissance vehicle finally emerged as the Luchs, of which 408 were built between 1975 and 1978. In the end only the 6×6 armoured personnel carrier entered production as the **Transportpanzer 1**. In 1977 Thyssen Henschel was awarded a production contract for 996 vehicles, the first of which was completed in 1979. The 4×4 was then developed into the APE amphibious engineer reconnaissance vehicle by EWK, but this was never placed in production. In 1983 Venezuela ordered about 10 Transportpanzer vehicles fitted with a 12.7-mm (0.5-in) and a 7.62-mm (0.3-in) machine-gun, and these were delivered by late 1983.

When used as an armoured personnel carrier the Transportpanzer can carry 10 fully equipped troops in addition to the commander and driver. In the West German army, however, the Transportpanzer is normally used for more specialized roles. The NBC reconnaissance vehicle, of which 140 are being built, is fitted with NBC detection equipment, and devices for taking soil samples and for marking the ground. The engineers have 220 vehicles which they use for carrying mines and demolition equipment about the battlefield. The electronic warfare version is the **TPz-1 Eloka** and has a large number of antennae on the roof and a generator to provide sufficient power to run the equipment. The supply units have 220 vehicles to supply forward units with ammunition and other essential supplies, and this model can also be used as a forward ambulance carrying up to four stretcher patients. The radar carrier has a RASIT battlefield surveillance radar mounted on a hydraulic arm which is raised above the roof of the vehicle, and this can be operated up to 30 m (98 ft) from the vehicle by remote control. There is also a command and control model with extensive communications equipment and a generator at the rear. The West German army vehicles are normally armed with a 7.62-mm (0.3-in) machine-gun above the commander's position but other weapons can be fitted on the roof of the troop compartment, including a 20-mm cannon. Mounted on the left side of the hull is a bank of six smoke dischargers firing forwards.

The commander and driver are seated at the front of the Transportpanzer with the engine immediately behind them on the left and the troop compartment at the rear; a small aisle connects the front and rear compartments. The latter has seats down each side, and these seats can be quickly folded to allow cargo to be carried. The compartment has two doors in the rear, roof hatches and three vision blocks. The Transportpanzer is fully amphibious, being propelled in the water by two propellers at the rear of the hull for a maximum water speed of 10.5 km/h (6.5 mph). All West German vehicles have an NBC system and passive night-vision equipment. Steering is power assisted on the front two axles.

For the export market a wider range of variants is offered, such as anti-tank vehicles with HOT, TOW or MILAN ATGWs, mortar carriers, a recovery vehicle and even an infantry fighting vehicle with firing ports and a turret-mounted 25-mm cannon.

Specification

Transportpanzer 1

Crew: 2+10

Combat weight: 17000 kg (37,479 lb)

Powerplant: one Mercedes-Benz OM 402A V-8 diesel developing 320 hp (239 kW)

Dimensions: length 6.76 m (22 ft 2.1 in); width 2.98 m (9 ft 9.3 in); height without armament 2.30 m (7 ft 6.5 in)

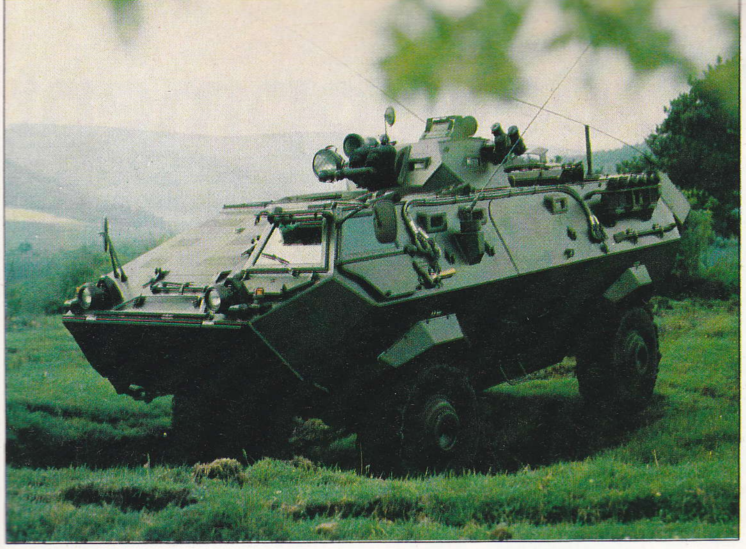
Performance: maximum road speed 105 km/h (65 mph); maximum range 800 km (497 miles); fording amphibious; gradient 70 per cent; trench 1.6 m (5 ft 3 in)

WEST GERMANY

Condor armoured personnel carrier

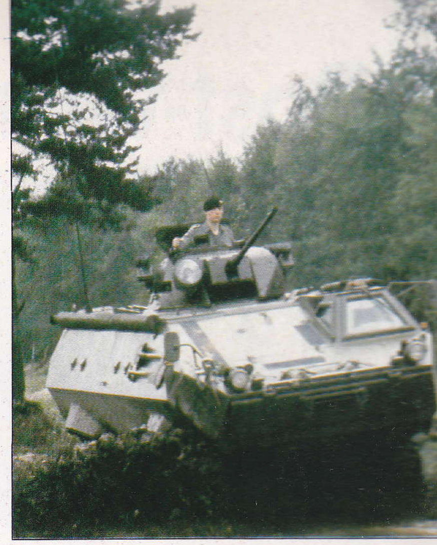
Following the success of the UR-416 armoured personnel carrier, Thyssen Henschel decided to develop a new vehicle with improved armour protection, greater speed and range, increased load-carrying capability, fully amphibious performance and able to mount heavier armament installations. The first prototype of this vehicle, called the **Condor**, was completed in 1978 and an initial sale was soon made to Uruguay. In 1981 Malaysia placed its largest ever order for armoured vehicles when 459 Condors were ordered from Thyssen Henschel and 186 SIBMAS 6×6 vehicles from Belgium.

The Condor has an all-welded steel hull which provides the crew with protection from small arms fire and shell splinters. Wherever possible standard automotive components (such as the engine and transmission) are taken from commercial sources to keep costs to a minimum. The Condor has a three-man crew consisting of the commander, who would normally dismount with the troops, the gunner and the driver, and carries nine fully equipped infantrymen. The driver is seated at the front left with the commander to his rear, each having a single-piece hatch cover that opens to the rear. The driver has excellent vision to his front and sides through large bullet-proof windows. In the combat area these would normally be covered by quickly erectable armoured shutters, forward observation then being maintained via a roof-mounted periscope. The engine compartment is to the right of the driver, and the troop compartment at the rear. Entry to the latter is effected via three doors, one in each side and one in the rear. The infantry sit on individual seats and can use their weapons from within the vehicle via firing ports and/or vision blocks. The main armament installation is normally in the centre of the hull, and can range from a turret with one or twin 7.62-mm (0.3 in) machine-guns right up to a power-operated turret with a 20-mm cannon. For the anti-tank role the vehicle has already been fitted, for trials purposes, with the Euromissile HOT turret with four ATGWs in the ready-to-launch



Left: A Thyssen Henschel Condor (4×4) armoured personnel carrier with a Rheinmetall TUR-1 one-man turret armed with twin 7.62-mm (0.3-in) machine-guns. In 1981 Malaysia ordered a total of 450 Condors, and all of these have now been delivered. The vehicle is fully amphibious.

Right: A Thyssen Henschel Condor (4×4) armoured personnel carrier fitted with a one-man turret armed with a 20-mm cannon and co-axial 7.62-mm (0.3-in) machine-gun. In addition to its three-man crew of commander, gunner and driver it can also carry 12 fully-equipped troops and their supplies.



position, additional missiles being carried in the hull. When fitted with a one-man turret accommodating a 20-mm cannon and a 7.62-mm (0.3-in) machine-gun, totals of 220 rounds of 20-mm and 50 rounds of 7.62-mm (0.3-in) ready-use ammunition are carried. The turret can also be fitted with smoke-dischargers or grenade-launchers on each side.

The Condor is fully amphibious, being propelled in the water by a single rear-hull propeller at a speed of 8 km/h (5 mph); before the vehicle enters the water a trim vane is erected at the front of the hull and the bilge pumps are switched on. The Condor can be equipped with a wide range of optional equipment such as passive night-vision devices, an NBC and/or air-conditioning system, various intercoms and radios, and a winch. The last is suggested as standard equipment for many parts of the world, for although the Condor has excellent amphibious capability, like most other vehicles it sometimes needs assistance in order to leave a river when the banks are very steep.

Specification
Condor
Crew: 3+9
Combat weight: 12000 kg (26,455 lb)
Powerplant: one Daimler-Benz OM 352A 6-cylinder diesel developing 168 hp (125 kW)
Dimensions: length 6.05 m (19 ft 10.2 in); width 2.47 m (8 ft 1.2 in); height without armament 2.10 m (6 ft 10.7 in)
Performance: maximum road speed 100 km/h (62 mph); maximum range 900 km (559 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.55 m (1 ft 9.7in); trench not applicable

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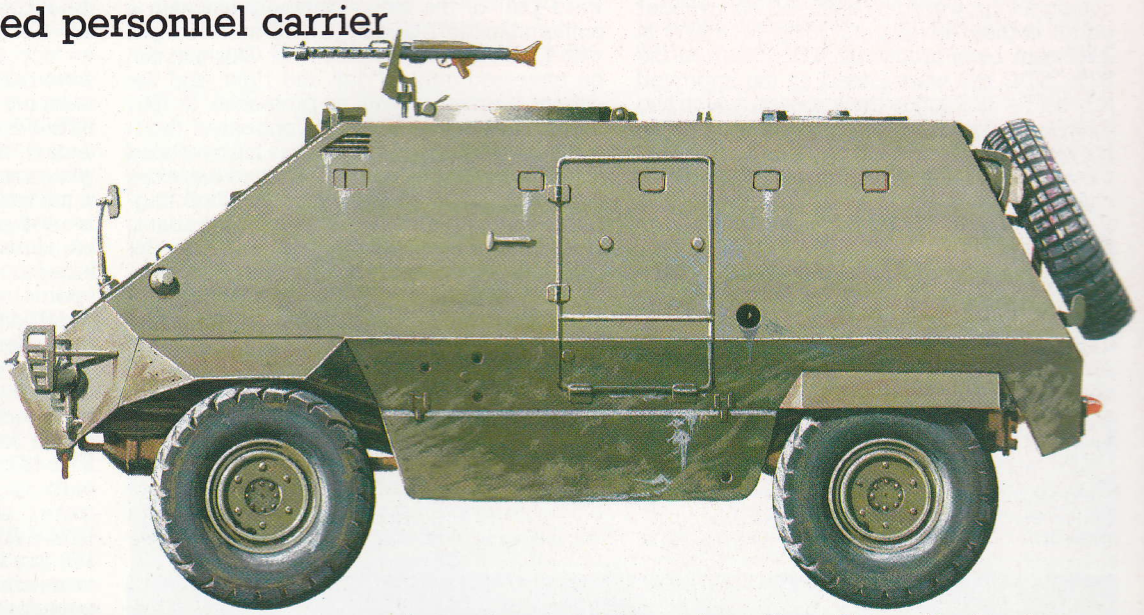
WEST GERMANY

UR-416 armoured personnel carrier



Above: Thyssen Maschinenbau UR-416 armoured personnel carrier.

The Daimler-Benz Unimog 4×4 was developed originally as a civilian vehicle in the period after World War II and soon established an excellent reputation for its cross-country capabilities. Development has continued, and the Unimog range of trucks, with typical payloads of one to four tonnes, is today used by many armed forces around the world, including those of Argentina, West Germany, New Zealand and Australia to name but a few.

In the early 1960s Rheinstahl Maschinenbau (now part of the Thyssen group) saw that there was a considerable overseas market for an armoured personnel carrier based on the chassis of the Unimog 4×4 truck, and the first **UR-416** prototype was completed in 1965. Production got under way four years later. By 1984 almost 1,000 vehicles had been completed, with sales made to countries in Black Africa, North Africa, South and Central America and the Far East, as well as to some European countries. European operators deploy the type mainly for airport patrol and riot control, while other countries use them for reconnaissance as well as their designed roles of carrying troops. The UR-416 is a relatively inexpensive vehicle and is simple to maintain and operate. Spare parts are not a problem as the chassis is identical to that of the Mercedes-Benz Unimog light truck.

The all-welded hull is 9 mm (0.35 in) thick and provides the crew with protection from small arms fire and shell splinters. The commander and driver are seated at the front with the eight fully equipped troops to their rear, three down each side facing outwards and two at the rear facing the rear. Firing ports are provided in the hull sides and rear to allow the troops to fire their rifles from inside the vehicle, and if required these standard ports can be replaced by spherical firing ports and an observation block which allows each man to fire his rifle or sub-machine gun from within the vehicle in complete safety. The UR-416 has two roof hatches, the forward one normally being fitted with a 7.62-mm (0.3-in) machine-gun that can also be provided with a shield.

As with most vehicles of this type, the UR-416 can be fitted with a wide range of optional equipment such as a rear-mounted winch with a capacity of 5000 kg (11,023 lb), passive or active night-vision equipment, an obstacle-clearing blade at the front of the hull, a public address system, flashing lights, a heater, a fire extinguisher, an air-conditioning system and run-flat tyres. In addition to the normal pintle-mounted 7.62-mm (0.3-in) machine-gun, other armament installations that can be fitted include a turret with one or two 7.62-mm (0.3-in) machine-guns, a turret with a 20-mm cannon, or a special cupola for use in internal security roles with vision devices and the ability to mount a rifle to engage snipers. More specialized versions include a repair vehicle complete with jib crane and a complete set of tools, an ambulance, and a command vehicle with extensive communications equipment. It was also proposed that the UR-416 could be fitted with a recoilless rifle or anti-tank guided missiles for use in the anti-tank roles, but as far as is known neither of these were placed in production.

Specification
UR-416
Crew: 2+8
Combat weight: 7600 kg (16,755 lb)
Powerplant: one Daimler-Benz OM 352 6-cylinder diesel developing 120 hp (89 kW)
Dimensions: length 5.21 m (17 ft 1 in); width 2.30 m (7 ft 6.5 in); height without armament 2.225 m (7 ft 3.6 in)
Performance: maximum road speed 85 km/h (53 mph); maximum range 600 to 700 km (373 to 435 miles); fording 1.4 m (4 ft 7 in); gradient 75 per cent; vertical obstacle 0.55 m (1 ft 9.7 in); trench not applicable

The Thyssen Maschinenbau UR-416 armoured personnel carrier is based on the chassis of the Mercedes-Benz Unimog (4×4) vehicle, which has exceptional cross-country mobility and is easy to maintain and operate.

Post-war Soviet APC Development

Soviet military doctrine has long held to the view that the offensive holds the key to success in battle. In order for the Soviet infantry to maintain contact with the armoured spearheads, it becomes necessary for the troops to be mobile and protected from enemy fire. The solution to the problem is the armoured personnel carrier.

During World War II Soviet infantry normally went into action on foot or clinging to the sides of tank turrets, which were provided with special grab rails for this purpose. The Soviet losses in tanks during the early part of the war meant that production capacity could not be spared for armoured personnel carriers. Canada and the UK shipped 2,500 Universal Carriers to the Soviet Union, while the United States shipped about 1,000 half-track carriers in various models, although some of these were lost at sea during transport to the Soviet Union.

The first wheeled armoured personnel carrier to enter service in the immediate post-war period was the BTR-152 in 1951, although it probably entered production a year or two before this date. This BTR-152 was essentially the chassis of the ZIL-151 6×6 2.5-tonne truck chassis and powered by a ZIL-121 six-cylinder petrol engine developing 92 hp (68.6 kW) at 2,600 rpm. Later production BTR-152s (from the BTR-152V1 on) were based on the improved ZIL-157 6×6 2.5-tonne truck chassis, which had many improvements including a more powerful six-cylinder petrol engine developing 110 hp (82 kW) at 3,000 rpm. All of the truck chassis were built at the Likhachev Motor Vehicle Plant in Moscow, the armoured body being fitted at another plant.

In appearance the BTR-152 was similar to the half-tracks of World War II, with the engine at the front, driver and commander in the centre and the troop compartment at the rear. The last entered the vehicle via twin doors in the hull rear, which normally also carried the spare wheel; firing ports were provided in the sides and rear of the troop compartment.

The second model, based on the improved chassis, was the BTR-152V1. This had a front-mounted winch (for self-recovery or for recovering other vehicles) and a central tyre-pressure regulator with external air lines. By then the latter was fairly common, having been fitted to some American DUKW amphibious 6×6 vehicles of the World War II period: for road travel the tyres are fully inflated, but for the crossing of other types of terrain (for example sand) air is let out by the driver, who does not leave his seat, so that more of the tyre is in contact with the ground and greater traction is therefore available. Once a firm surface is reached the driver then reinflates the tyres, again without leaving his seat. The BTR-152 has full six-wheel drive, the engine being coupled to a manual gearbox with five forward and one reverse gear (fifth gear being overdrive) and a two-speed transfer case; this has high and low ranges, the latter being engaged for cross-country travel.

The 1950s

The BTR-152VI was followed by the almost identical BTR-152V2, which is not fitted with a winch but has a central tyre-pressure regulation system. The BTR-152V3 was the last model to have an open-topped troop compartment, and is fitted with a front-mounted winch, internal air lines less prone to damage than the external ones, and infra-red driving lights. All these models are normally armed on the forward part of the troop compartment with a pintle-mounted 7.62-mm (0.3-in) machine-gun with 1,250 rounds of ammunition. This gun can be traversed only 45° left and right, and the gunner is provided with no protection. In 1961 the much improved BTR-152K appeared: this is similar to the BTR-152V3 but has full overhead cover for the troop compartment and therefore offers protection against overhead shell fragments and mortar splinters. Two basic variants were fielded by the Soviet Union, namely the BTR-152U command vehicle with a much higher roof to allow the command staff to work upright, and the BTR-152A anti-aircraft vehicle. The latter has a turret armed with twin 14.5-mm (0.57-in) machine-guns with manual traverse and elevation. A number of countries around the world have modified the BTR-152 to meet their own requirements.

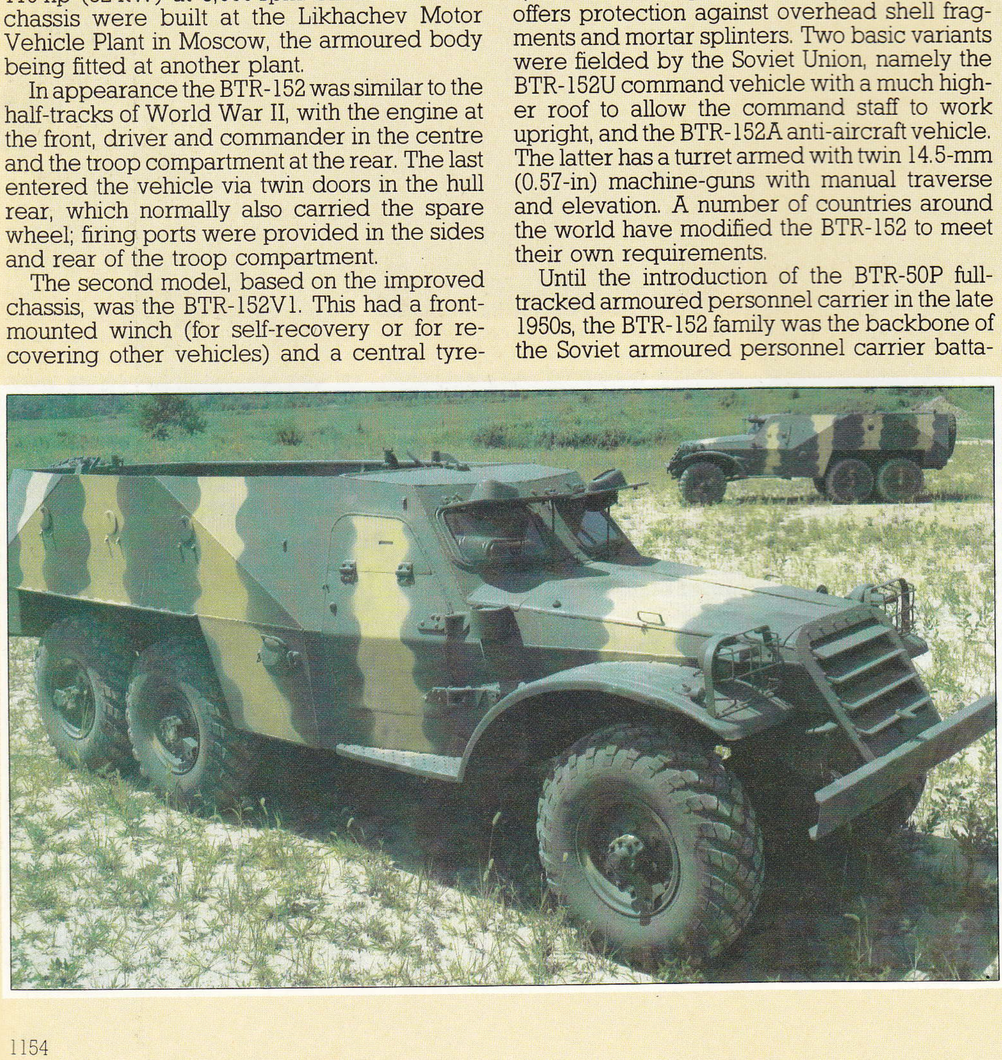
Until the introduction of the BTR-50P full-tracked armoured personnel carrier in the late 1950s, the BTR-152 family was the backbone of the Soviet armoured personnel carrier battalions, but from about 1960 it started to be replaced by the BTR-60P 8×8 series of armoured personnel carriers although the first models, with their open-topped troop compartments, had the same disadvantages as the original open-topped BTR-152s.

The BTR-152 saw action with the Egyptian army in the 1956 Middle East conflict, and more recently has been encountered in some numbers by the South African army during its many incursions into Angola in pursuit of or search for SWAPO guerrillas. The BTR-152 was also used by the PLO in the Lebanon, and many were captured or destroyed by the Israeli army in the 1982 'Peace for Galilee' operation.

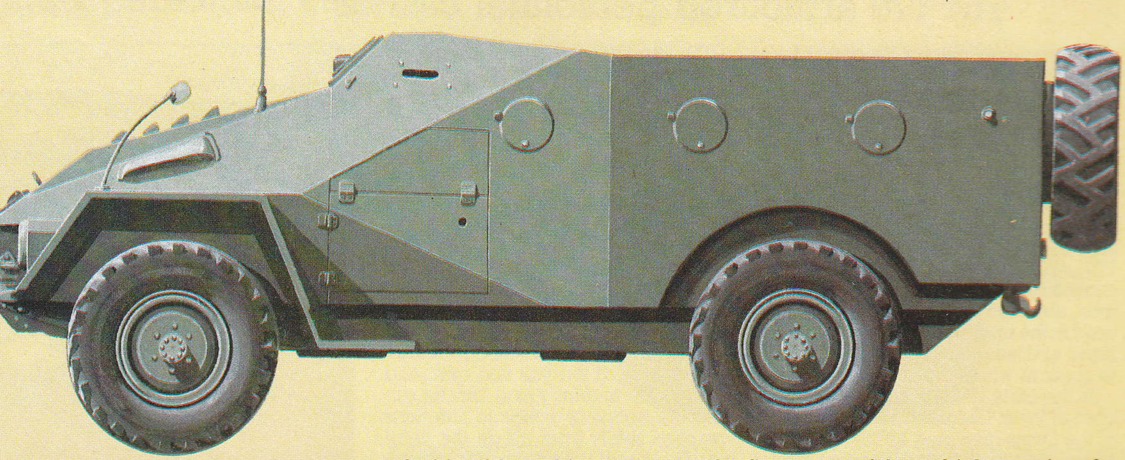
The BTR-152 was soon followed by the BTR-40 4×4 armoured personnel carrier based on a shortened GAZ-63 4×4 1.5-tonne truck chassis produced at the Gorky Motor Vehicle Plant. The BTR-40 entered service in 1951, has a crew of two and can carry eight fully equipped men. It has not always been used as an armoured personnel carrier, however, and was often employed as a reconnaissance or command and control vehicle in a manner similar to the American M3A1 4×4 scout car, of which some 3,300 were shipped to the Soviet Union by the United States during World War II. In the reconnaissance role the BTR-40 was replaced by the BRDM-1 4×4 amphibious vehicle from the late 1950s, and today the type is no longer used by any front-line Soviet unit. Most BTR-40s were built with an open-topped crew compartment but later production vehicles, designated BTR-40B, are fitted with overhead armour protection. The BTR-40 is not fitted with central tyre-pressure regulation and, like the BTR-152, is not fitted with an NBC system. The BTR-40A is a self-propelled anti-aircraft vehicle and has the same twin 14.5-mm (0.57-mm) machine-gun turret as the BTR-152A, while the BTR-40kh is a special chemical reconnaissance vehicle which dispenses pennants into the ground to mark clear lanes through contaminated areas. The Egyptians have built a vehicle similar to the BTR-40 called the Walid, and this has been exported to some countries in the Middle East.

The Soviets realized the shortcomings of the BTR-152 6×6 armoured personnel carrier at an early stage and soon started to develop a new carrier which finally emerged in 1961 as the BTR-60P 8×8 vehicle. Compared with the BTR-152 this has a higher road speed and better cross-country mobility, and is fully amphibious, being propelled in the water by a single water-jet at the hull rear which provides a water speed of 10 km/h (6.21 mph). Its main drawback was still its open-topped crew compartment, which makes the crew very vulnerable. The troop compartment is provided with firing ports and side doors, and up to three (normally one 12.7-mm/0.5 in and two 7.62-mm/0.3-in) machine-guns can be fitted to provide suppressive fire. An interesting feature of the BTR-60P series is that it is powered by two petrol engines, each of which drives four wheels on one side of the vehicle.

The original BTR-60P was soon followed by the BTR-60PA which has a fully enclosed troop compartment and is normally armed with a roof-mounted 7.62-mm (0.3-in) machine-gun in



A Soviet BTR-152 (6×6) armoured personnel carrier, used by the United States Army for training purposes. The main drawback of this vehicle was its lack of cross-country mobility and open-topped hull, which made the troops very vulnerable to overhead shell bursts. It is still used by many countries.



The BTR-40 (4×4) is essentially a short-wheelbase version of the GAZ-63 truck fitted with an armoured body. In addition to being used as an armoured troop carrier it was also employed as a command and reconnaissance vehicle; there is also an anti-aircraft model with twin 14.5-mm (0.57-in) machine-guns, called the BTR-40A.

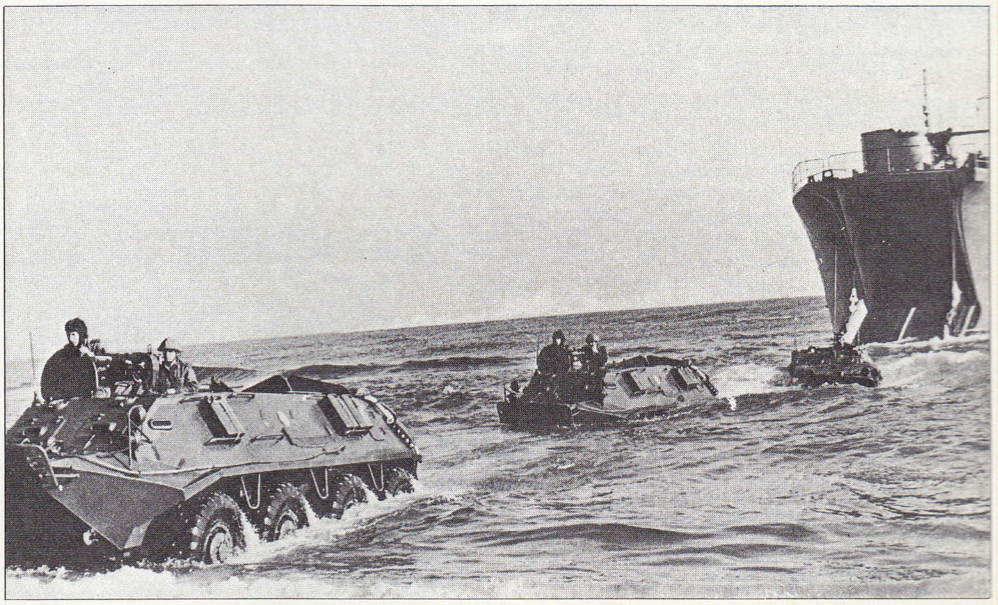
an unprotected mount. The next model to appear was the BTR-60PB, which is almost identical to the BTR-60PA but has a one-man manually-operated turret armed with a 14.5-mm (0.57-in) and a 7.62-mm (0.3-in) machine-gun. This turret is identical to that fitted to the BRDM-2 4×4 amphibious scout car and the Czech OT-64 Model C 8×8 armoured personnel carrier, which is also used by Poland instead of the Soviet vehicle, which the Poles consider to have a number of drawbacks. There are a number of variants of the BTR-60 series including the BTR-60PU command vehicle and the BTR-60PB forward air control vehicle. The former is a BTR-60P or BTR-60PA fitted with extensive communications equipment, generator and radio antennae, while the latter has the turret with the armament removed and the hole filled in with a Plexiglas observation window. As the basic BTR-60 series normally has only two batteries, an auxiliary generator is usually carried to provide sufficient power for the additional communications equipment. All members of the BTR-60 series have a central tyre-pressure regulation system, front-mounted winch with a capacity of 4500 kg (9921 lb) and infra-red night vision equipment for the commander and driver. The BTR-60 series has been exported to some 30 countries and its excellent amphibious capability is such that it is also used by the Soviet Marines. Romania builds a similar vehicle called the TAB-72.

The 1980s

The latest Soviet wheeled armoured personnel carrier is the BTR-70, which is very similar to the earlier BTR-60PB and even has the same turret. The original BTR-60 series vehicles are powered by two GAZ-49B six-cylinder inline petrol engines each developing 90 hp (67 kW), and though it had been expected that the new vehicle would be powered by diesel engines, both to reduce the risk of fire and to extend the operational range of the vehicle, recent information has shown that the BTR-70 is powered by two ZMZ-4905 petrol engines each developing 115 hp (86 kW). Because of the higher weight of vehicle, performance is identical to that of the BTR-60. The BTR-60PB can carry 14 fully equipped infantry plus its two-man crew, although normally only eight men are carried. These troops are seated on bench seats down each side and rear of the troop compartment with two on seats to the rear of the commander and driver at the front of the vehicle. This made it almost impossible for the troops to use the firing ports in the sides of the troop compartment. On the more recent BTR-70 a large bench seat is fitted in the centre of the troop compartment for six men (three on each side facing outwards), and these can use the three firing ports in each side of the vehicle. On the BTR-60PB the infantry left the vehicle via the roof hatches or a single hatch in the side of the hull between and well above the second and third axles. This meant that they were exposed to small arms fire for longer than necessary, and on the BTR-70 the two hatches in the roof are supplemented by a door in the lower part of the hull between the second and third axles. The BTR-70 has a full range of night-vision equipment and an NBC system.

Both the BTR-60 and BTR-70 have been used in Afghanistan, where their thin armour has proved to be very vulnerable to heavy machine-gun fire, as have the wheels. To improve the firepower of the vehicles against the Afghan rebels some vehicles have been fitted with a 30-mm automatic grenade-launcher on the turret roof, although one member of the crew has to leave the safety of the hull to fire this weapon.

Front-line Soviet armoured and motorized divisions currently use the full-tracked BMP-1 with its excellent mobility, firepower and protection, and also the BTR-60 and BTR-70. The latter have inferior firepower and armour protection to the BMP-1, but have greater strategic mobility and are much cheaper to build, maintain and operate than their tracked counterpart.



Above: Two East German BTR-60Ps swim ashore from a landing craft followed by a BRDM-1 (4×4) amphibious scout car. In some East German and Soviet units the BTR-60 series have been replaced by the improved BTR-70 (8×8) vehicle.

Below: The first model of the BTR-60 series to enter service was the BTR-60P, which had an open-topped troop compartment and was normally armed with one 12.7-mm (0.5-in) and two 7.62-mm (0.3-in) machine-guns on pintle mounts.

WEST GERMANY

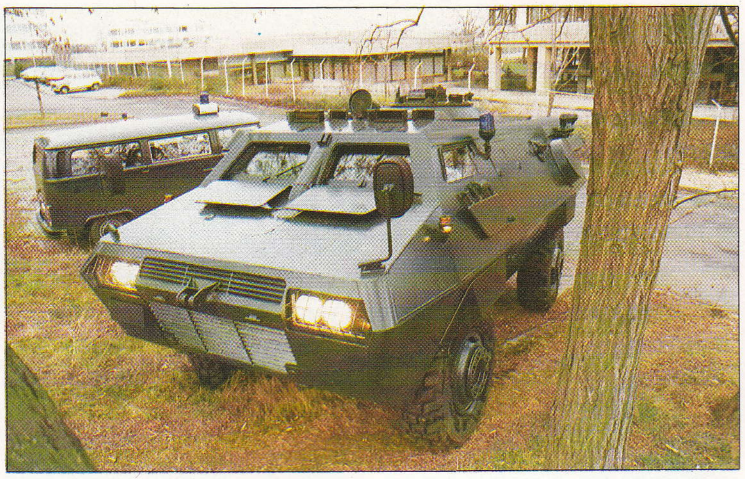
TM 170 armoured personnel carrier

Using company money, Thyssen Maschinenbau of Witten-Annen has developed three light armoured personnel carriers of the wheeled variety, all of them using proven and common commercial components to keep procurement and operating costs to an absolute minimum. The vehicles are the **TM 170**, **TM 125** and the **TM 90**. The largest member of the family is the TM 170, which has a two-man crew and can carry 10 fully equipped infantrymen, although more often than not it is used in the internal security role for the rapid and safe transport of riot squads to spots at which they are needed.

In the early 1960s Bussing and Henschel in West Germany built some 600 of the Swiss-designed MOWAG MR 8 series of 4×4 armoured personnel carriers for the Federal German border police, although at a later date some of these were transferred to the state police. By the early 1980s it had been decided to start replacing this old vehicle with a more modern type, and after looking at the various vehicles on offer, the border police and state police selected the TM 170 under the designation **SW4**, the SW1 being the basic MR 8, the SW2 being the same vehicle with a turret-mounted 20-mm cannon and the SW3 an armoured version of the Mercedes-Benz light jeep type vehicle. At least 250 examples of the SW4 are required, although funding problems have meant that the initial order was for only 87 vehicles, the first of these being delivered in 1983.

The TM 170 has a hull of all-welded steel construction with the engine at the very front of the hull and coupled to a manual gearbox with four forward and one reverse gear. For road use the driver would normally select 4×2 (rear wheels only) drive, while for cross country the front axles would also be engaged for 4×4 (all wheel) drive. The commander and driver have bullet-proof windows to their front, and in combat these are covered by armoured shutters, observation then being obtained through roof-mounted periscopes. An entry door is provided in each side of the hull and rear, and firing ports and/or vision blocks enable the troops or police to aim their weapons safely from inside the vehicle. The basic vehicle is fully amphibious, being propelled in the water by its wheels; before the vehicle enters the water a trim vane is erected at the front of the hull. For increased water speed the TM 170 can be fitted with waterjets, which give a maximum speed of 9 km/h (5.6 mph). A variety of armament stations can be fitted on the roof including turret- or pintle-mounted 7.62-mm (0.3-in) machine-guns or even 20-mm cannon. Specialized equipment for the riot-control role includes a hydraulically-operated dozer blade at the front of the hull (for clearing street barricades and pushing cars and other obstacles out of the way) and a special observation cupola.

The TM 125 is slightly smaller than the TM 170, has a crew of two and can carry 10 fully equipped men. The TM 90 is an armoured patrol vehicle rather than an armoured personnel carrier and has a crew of four, including the driver.



A Thyssen Maschinenbau TM 170 (4×4) armoured personnel carrier with the hatches over the windscreen in the lowered position. The TM 170 has been selected by the West German Border Guard and State Police to replace the old SW1 and SW2 vehicles.

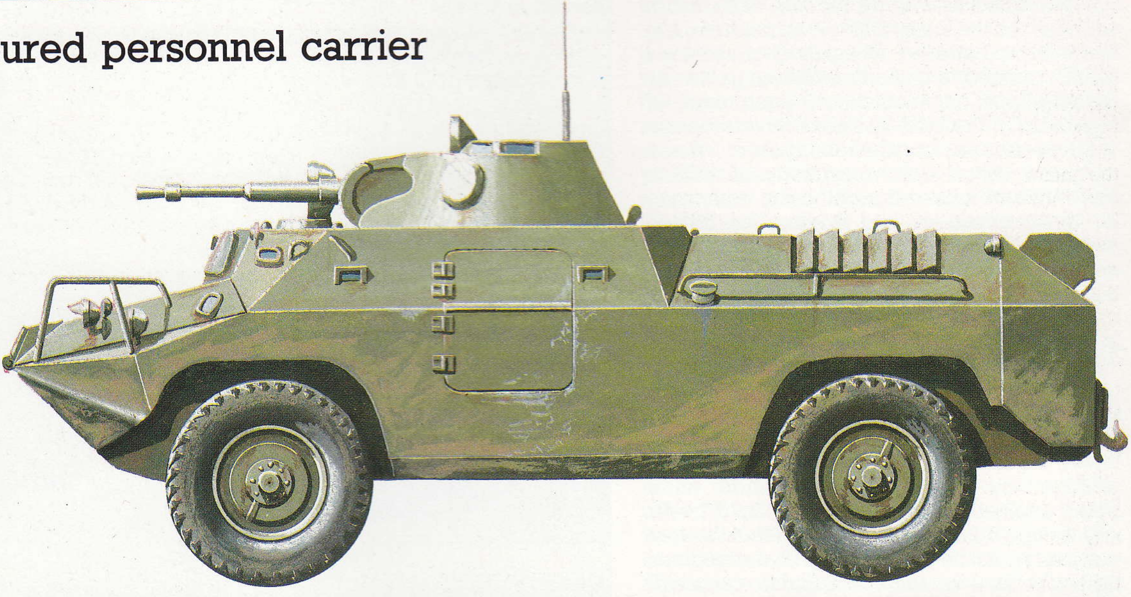
Specification
TM 170
Crew: 2+12
Combat weight: 9500 kg (20,944 lb)
Powerplant: one Daimler-Benz OM 352 supercharged diesel developing 168 hp (125 kW)
Dimensions: length 6.10 m (20 ft 0 in); width 2.45 m (8 ft 0.5 in); height 2.22 m (7 ft 3.4 in)
Performance: maximum road speed 100 km/h (62 mph); maximum range 670 km (416 miles); fording amphibious; gradient 80 per cent; vertical obstacle 0.5 m (1 ft 7.7 in); trench not applicable

HUNGARY

PSZH-IV armoured personnel carrier

In the 1960s Hungary developed the FUG 4×4 amphibious scout car, which it uses in place of the Soviet BRDM vehicle. Further development resulted in a vehicle which was seen in the mid-1960s and called the **FUG-66** or **FUG-70**. It was originally thought that this was the replacement for the original FUG and that it would be used in place of the Soviet BRDM-2 4×4 amphibious scout car. After some time it was discovered that the new vehicle was in reality called the **PSZH-IV** and that its role was that of a personnel carrier, not an amphibious scout vehicle.

The hull of the PSZH-IV is of all-welded steel construction with a maximum thickness of 14 mm (0.55 in). The commander and driver are seated at the front of the vehicle, each being provided to his front with a windscreen that can be quickly covered by an armoured shutter with an integral periscope. Above their position is a single-piece roof hatch and to each side is a vision block. Mounted in the centre of the roof is a one-man turret armed with a 14.5-mm (0.57-in) KPVT machine-gun with a 7.62-mm (0.3-in) PKT machine-gun mounted co-axially to the left. Both weapons have an elevation of +30° and a depression of −5°, turret traverse being 360°. Totals of 500 rounds of 14.5-mm (0.57-in) and 2,000 rounds of 7.62-mm (0.3-in) ammunition are carried. The turret is of Hungarian design and is not the same as that fitted to the Soviet BRDM-2 amphibious scout car and a number of BTR-60 and OT-64 series of armoured personnel carriers.



When the PSZH-IV was first seen in the early 1960s its role was believed to be that of a reconnaissance vehicle, but it was later discovered that it was in fact an armoured personnel carrier and carried six troops in addition to its three-man crew consisting of a commander, gunner and driver.

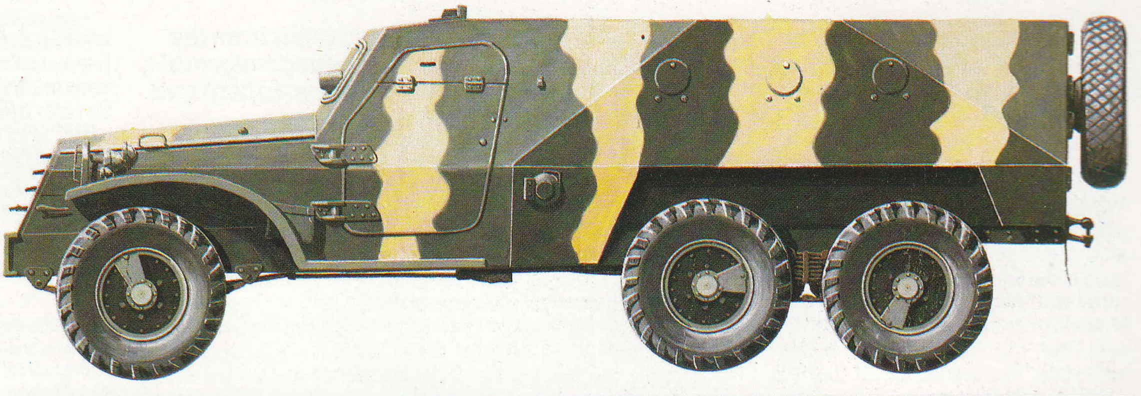
The troops enter and leave the PSZH-IV through a door in each side of the hull; each door is in two parts, upper and lower, and opens towards the front of the vehicle. The engine, which is the same as that installed in the earlier FUG amphibious scout car, is mounted at the rear of the hull. The PSZH-IV is fully amphibious, being propelled in the water at a speed of 9 km/h (5.6 mph) by two waterjets at the rear of the hull. Before the vehicle enters the water the bilge pumps are switched on and a trim vane is erected at the front of the hull (when not required the latter is stowed on the glacis plate). Like most Warsaw Pact vehicles developed in recent years, the PSZH-IV is fitted with a central tyre-pressure regulation system (allowing the driver to adjust the tyre pressure to suit the type of ground being crossed), an NBC system and infra-red night-vision equipment for the gunner and commander.

There are a number of variants of the PSZH-IV including two command vehicles (one with and the other without the turret), an ambulance model (although loading of stretchers cannot be considered to be an easy occupation) and an NBC reconnaissance vehicle. The last is probably provided with equipment to detect NBC agents and then drop pennants into the ground to mark a path through the contaminated area.

Specification
PSZH-IV
Crew: 3+6
Combat weight: 7500 kg (16,535 lb)
Powerplant: Caspel 4-cylinder diesel developing 100 hp (74.57 kW)
Dimensions: length 5.70 m (18 ft 8.4 in); width 2.50 m (8 ft 2.4 in); height 2.30 m (7 ft 7 in)
Performance: maximum road speed 80 km/h (50 mph); maximum range 500 km (311 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.4 m (1 ft 3.7 in); trench 0.6 m (1 ft 11.6 in)

USSR

BTR-152 armoured personnel carrier



Above: A BTR-152 (6×6) armoured personnel carrier fitted with a central tyre pressure regulation system that allows the driver to adjust the pressure to suit the type of ground being crossed.

Right: Soviet BTR-152 (6×6) armoured personnel carriers being supported by T-54 tanks. Until the introduction of the BTR-60 (8×8) armoured personnel carrier in the 1960s the BTR-152 was the standard vehicle of the Soviet motorized rifle divisions.

The Soviet Union did not employ a tracked or wheeled armoured personnel carrier during World War II, and her infantry normally went in on foot or were carried on tanks. The **BTR-152** was first seen in public during 1951, but probably entered service several years before this. The vehicle consists basically of a ZIL-151 truck chassis fitted with a fully armoured body, later production vehicles from the BTR-152V1 onwards being based on the improved ZIL-157 truck chassis. From the early 1960s it was replaced in front-line Soviet motorized rifle divisions by the BTR-60 series of 8×8 armoured personnel carriers, which have better cross country capabilities. The BTR-152 and its variants have been widely exported by the Soviet Union, and even in 1984 the type remains in service with some 30 countries all over the world, and the BTR-152 has seen action in the Middle East (with Syria, Iraq and Egypt), Africa and the Far East.

The first model to enter service was the BTR-152, and has an open-topped troop compartment, in which the 17 troops sit on bench type seats running across the hull. The second model to enter service was the **BTR-152V1**, which retained the open-topped troop compartment but was fitted with a front-mounted winch and a central tyre-pressure regulation system with external air lines. The latter system enables the driver to adjust the tyre pressure to suit the type of ground being crossed. The **BTR-152V2** was not fitted with a winch, but did have a tyre-pressure regulation system. The **BTR-152V3** had winch, infra-red night-vision equipment and a central tyre-pressure regulation system with internal air lines more robust than those of the external system. The main drawback of these versions was the open-topped troop compartment, which left the infantry vulnerable to overhead shell bursts. This was rectified with the introduction of the **BTR-152K** which had full overhead protection. In all versions of the BTR-152 firing ports are provided in the sides and rear of the troop compartment. The infantry enter and leave the vehicle via two doors in the rear of the hull.

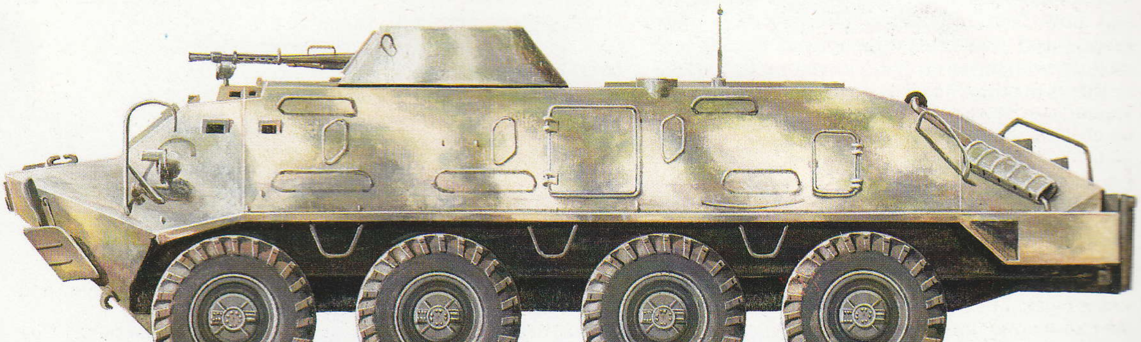
The command version is called the **BTR-152U** and has a much higher roof so the command staff can work while standing; it also has an armoured roof. The anti-aircraft model is the **BTR-152A**, which has at its rear a mount with twin 14.5-mm (0.57-in) KPV heavy machine-guns that can be elevated from −5° to +80° with turret traverse through 360°. During the fighting in the Lebanon in 1982, the Israeli army captured a number of BTR-152s from the PLO: these vehicles had the towed ZU-23 twin 23-mm mounted in the rear, these being much more effective than the 14.5-mm (0.57-in) KPVs.

The first armoured personnel carrier to be deployed by the Soviet Union after World War II was in fact the **BTR-40 4×4** vehicle, which was based on a modified GAZ-63 truck chassis. This could carry eight troops in addition to its two-man crew and was also used as a reconnaissance vehicle until the introduction of the BRDM-1 in the 1950s. Both the BTR-40 and BTR-152 were normally armed with a pintle-mounted 7.62-mm (0.3-in) machine-gun.

Specification
BTR-152V1
Crew: 2+17
Combat weight: 8950 kg (19,731 lb)
Powerplant: one ZIL-123 6-cylinder petrol engine developing 110 hp (82 kW)
Dimensions: length 6.83 m (22 ft 4.9 in); width 2.32 m (7 ft 7.3 in); height 2.05 m (6 ft 8.7 in)
Performance: maximum road speed 75 km/h (47 mph); maximum road range 780 km (485 miles); fording 0.8 m (2 ft 7.5 in); vertical obstacle 0.6 m (1 ft 11.6 in); trench 0.69 m (2 ft 3.2 in)

USSR

BTR-60P series armoured personnel carrier



A BTR-60PB (8×8), which has the same turret as fitted to the BRDM-2 (4×4) scout car and the Czech OT-64C (8×8) vehicle.

The BTR-152 6×6 armoured personnel carrier introduced into the Soviet army during the 1950s had a number of major shortcomings, including poor cross-country mobility (as it was based on a truck chassis) and lack of an amphibious capability. In the late 1960s the **BTR-60P** was introduced, and this and later variants have now replaced almost all BTR-152s used by the Soviet army, in which the BTR-60 series is normally used by the motorized rifle divisions while the tank divisions have the BMP-1 tracked MICVs. The BTR-60 series has been exported to some 30 countries, and Romania has produced a modified version under the designation **TAB-72**. The BTR-60 has seen action in many parts of the world, most recently in Grenada when a few BTR-60PBs were encountered and quickly destroyed by United States forces.

The members of the BTR-60 series are all fully amphibious, being propelled in the water by a single waterjet under the rear of the hull at a speed of 10 km/h (6.21 mph), and have a similar layout with the commander and driver at the front, troop compartment in the centre and the two petrol engines at the rear. Each engine drives one side of the vehicle. Power-assisted steering is provided on the front two axles.

The first model to enter service was designated BTR-60P, and has an open-topped troop compartment. This carried a total of 16 infantrymen who were seated on bench seats across the hull. Armament normally consisted of one 12.7-mm (0.5-in) and two 7.62-mm (0.3-in) machine-guns. This was soon replaced in production by the **BTR-60PA**, which has a fully enclosed troop compartment and carries a maximum of 16 troops, although its normal complement is 12. This model is generally armed with a pintle-mounted 7.62-mm (0.3-in) machine-gun. The **BTR-60PB** is similar to the BTR-60PA but is fitted with the same one-man manual turret as installed on the BRDM-2 4×4 scout car and the Czech OT-64C(1) armoured personnel carrier, used by Czechoslovakia and Poland (as the SKOT-2A) in place of the Soviet vehicle. The infantry carried by the BTR-60PA and the BTR-60PB can aim and fire their weapons from within the vehicle, although they normally have

Continued on page 1160

Kabul Convoy

To a Soviet infantryman serving in Afghanistan, the prospect of venturing from the strongly fortified towns on supply missions to outlying posts must be uncomfortable. In common with many unwelcome visitors over the years, the hostile reception from the Afghan hillmen has given the Soviets pause.

When the Red Army moved into Afghanistan over the Christmas period of 1979 they probably expected, like many other armed groups who have moved into the area, that all would be quiet and peaceful after a few days, that things would soon settle down into a normal routine, and that the locals would accept them and welcome the arrival of all that the Red Army could bring in its wake. Like all the other arrivals over the years they were wrong, very wrong, for the Afghans have always been implacably hostile to anyone who moves into their territory uninvited. Like the British and so many others before them, the Red Army no doubt wishes that it had never heard of the place, but it is still there and is having to fight just to maintain its tenure. Large tracts of territory are still closed to the Soviets by hostile tribesmen, who inflict casualties and damage out of all proportion to their modest numbers.

The Soviets want to stay in Afghanistan for several reasons. One is that occupation of the country places them one step nearer the Indian Ocean 'blue water' port and territory they have coveted for centuries, and another is that the position of Afghanistan places them close to considerable areas of surrounding nations, so enabling them to eavesdrop electronically on these neighbours to a much more useful degree than is possible from within Soviet borders. Consequently the Red Army has established a number of monitoring stations throughout Afghanistan. This has meant that the Red Army has had to build, maintain and supply these stations over a prolonged period, for they are often located in remote areas away from the main centres of population.

Constant danger

Normally such an operation would be no problem, but the Afghan guerrillas make the task an almost impossible one. The Red Army has now had to institute the use of heavily armed and armoured convoys just to maintain its links with these outlying locations, and these convoys are inevitably a major drain on Soviet resources. They are often attacked, very often by small Afghan guerrilla groups who fire a few shots and then vanish into the mountains. At times the attacks are made by much larger groups, who manage to knock out a truck or even a tank using rockets. Thus the Soviets have to guard their convoys as though a large attack is expected on every trip.

The actual composition of these convoys varies greatly depending on the distance involved and the nature of the supplies being carried. Most types of supplies make good booty for the guerrillas if they can manage to capture a truck, but their main aim is to capture weapons and ammunition. At even the most peaceful of times all rural Afghan males carry rifles and ammunition and in what they regard as times of war, such as the present, they are on the look-out for more, so very often arms and ammunition are for protection convoyed in converted armoured personnel carriers.

The Red Army's tracked armoured personnel carriers are of limited use in Afghanistan as the rough and mountainous terrain is not suitable for their tracks, so wheeled personnel carriers and trucks have to be used. Thus the convoys are made up from virtually every type of Soviet wheeled carrier ranging from the newest BTR-70 down to BTR-40s taken without compunction from the remaining units of the regular Afghan army. The trucks in convoy likewise come from whatever stocks are available and vary from the most modern to the veteran.

Attack from above

All these vehicles suffer from one major drawback, the fact that they are rarely able to carry weapons with high angles of elevation. The roads and tracks to the outlying Soviet locations almost inevitably run through hilly or mountainous terrain, and the guerrillas usually mount their attacks from the highest possible locations. The only way to counter this plunging fire is by using high-angle weapon mountings, but on many armoured personnel carriers these mountings can accommodate little more than machine-guns and in ambush situations heavier weapons are generally required.

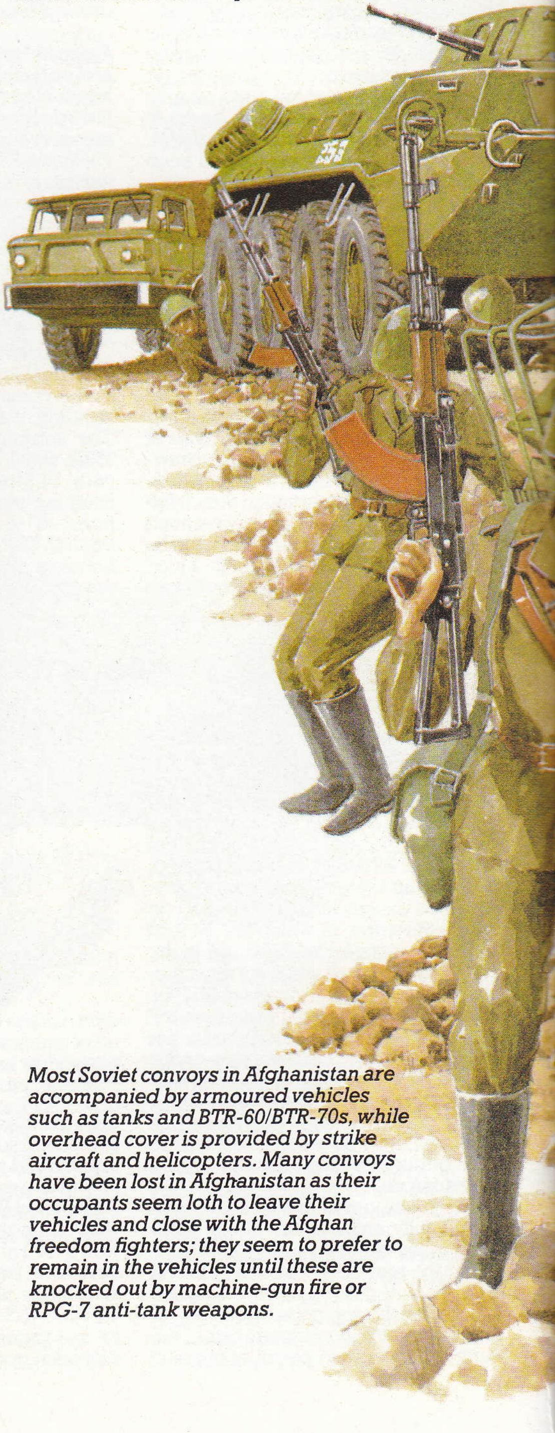
On some of the open carriers such as the BTR-152 it is possible to mount heavier weapons such as anti-aircraft cannon, but by their very nature these open vehicles are prone to the worst depredations of the ambushers' fire and the occupants are very exposed to incoming fire. In some of the more restricted passes and valleys ambushing fire can be almost vertically downwards, so open vehicles are terribly vulnerable. This was soon learned when heavy trucks such as the ZIL-135 8×8 were converted for the convoy escort role by the installation of twin 23-mm cannon on the load area: the cannon were very effective weapons but the guerrillas soon learned to pick off their crews before they could do too much damage.

Whenever possible, therefore, the Soviets use the fully enclosed armoured personnel carriers such as the BTR-60P and the newer BTR-70. Sometimes they are joined by BRDM-1 and BRDM-2 reconnaissance cars but their internal stowage space is very limited and they are usually confined to the escort role.

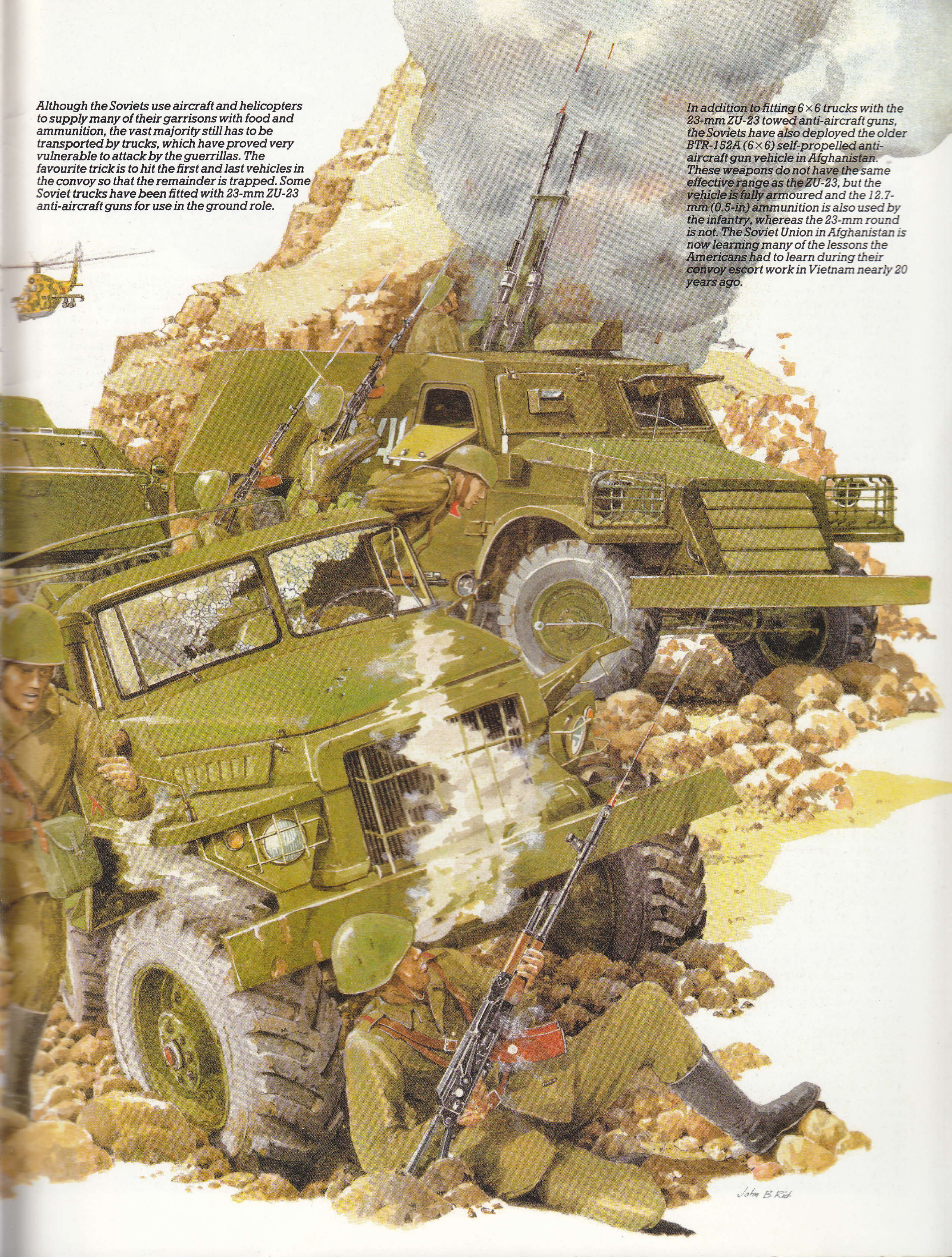
The convoys do have one escort vehicle that the Afghan guerrillas cannot tackle, and this is the Mil Mi-24 'Hind' helicopter. These helicopters are virtually flying tanks, and they are the one Soviet weapon that the Afghans fear. The 'Hinds' are heavily armed and armoured, and the only way in which the guerrillas can damage them is by firing or dropping grenades down on to their rotor arcs from above, but such methods rarely provide results as the 'Hinds' usually move much too fast for such chances to be taken.

So for the foreseeable future convoys will move along the narrow passes and tracks of Afghanistan from the Red Army's main supply base at Kabul to all the many outstations that the Soviets have established in the face of a hostile population. They can proceed only in daylight and under air cover supplied by the powerful 'Hind' helicopters, but are at almost any point under threat of attack or ambush. It must all be costing the Soviet Union a great deal of money, lives and resources and by now, in common with many other 'visitors' to Afghanistan, the Soviets must be wondering if it is all worth the effort and cost involved. In the meantime the convoys from Kabul rumble on and the Afghan guerrillas continue to wait until the tactical situation is right for the next attack.

The BTR-60PB and BTR-70 (8×8) armoured personnel carriers are widely used in Afghanistan for escorting convoys through areas occupied by the Afghan freedom fighters. Many of these have been fitted with additional armour, and some even have an AGS-17 automatic grenade-launcher fitted on top of the hull to provide suppressive fire against suspected guerrilla positions when the Soviet air force cannot provide close air support.



Most Soviet convoys in Afghanistan are accompanied by armoured vehicles such as tanks and BTR-60/BTR-70s, while overhead cover is provided by strike aircraft and helicopters. Many convoys have been lost in Afghanistan as their occupants seem loth to leave their vehicles and close with the Afghan freedom fighters; they seem to prefer to remain in the vehicles until these are knocked out by machine-gun fire or RPG-7 anti-tank weapons.



Although the Soviets use aircraft and helicopters to supply many of their garrisons with food and ammunition, the vast majority still has to be transported by trucks, which have proved very vulnerable to attack by the guerrillas. The favourite trick is to hit the first and last vehicles in the convoy so that the remainder is trapped. Some Soviet trucks have been fitted with 23-mm ZU-23 anti-aircraft guns for use in the ground role.

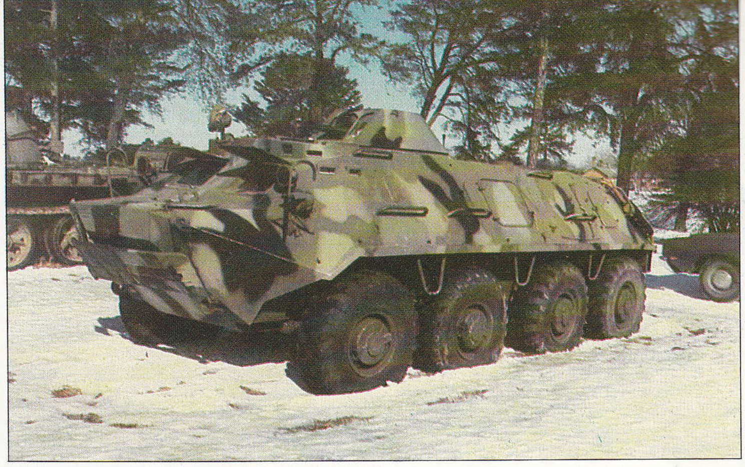
In addition to fitting 6×6 trucks with the 23-mm ZU-23 towed anti-aircraft guns, the Soviets have also deployed the older BTR-152A (6×6) self-propelled anti-aircraft gun vehicle in Afghanistan. These weapons do not have the same effective range as the ZU-23, but the vehicle is fully armoured and the 12.7-mm (0.5-in) ammunition is also used by the infantry, whereas the 23-mm round is not. The Soviet Union in Afghanistan is now learning many of the lessons the Americans had to learn during their convoy escort work in Vietnam nearly 20 years ago.

BTR-60P series APC (continued)

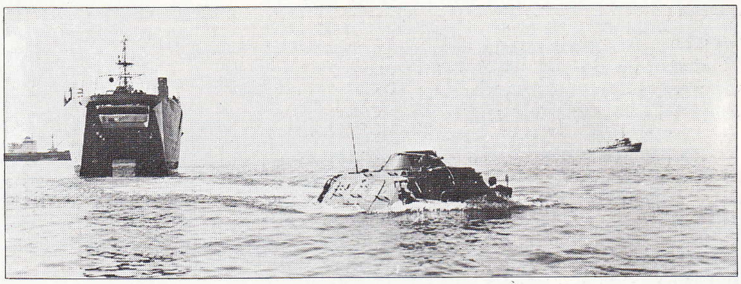
to dismount by climbing through the roof hatches. The command version of the vehicle is called the **BTR-60PU** and has additional communications equipment; there is also a forward air control vehicle, basically the BTR-60PB with the armament removed and an observation window in the forward part of the turret.

The BTR-60PB is now being replaced in the Soviet Union by the **BTR-70**, which is very similar in appearance and has the same turret, but introduces a slightly more powerful engine and has improved seating and exit arrangements for the infantry, the roof hatches being supplemented by a small door in the lower part of the hull between the second and third road wheels. The BTR-70 has seen action in Afghanistan, where a number have been fitted with a 30-mm grenade-launcher on the roof.

Specification
BTR-60PB
Crew: 2+14
Combat weight: 10300 kg (22,708 lb)
Powerplant: two GAZ-49B 6-cylinder petrol engines each developing 90 hp (67 kW)
Dimensions: length 7.56 m (24 ft 9.6 in); width 2.825 m (9 ft 3.2 in); height to top of turret 2.31 m (7 ft 6.9 in)
Performance: maximum road speed 80 km/h (50 mph); maximum road range 500 km (311 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.4 m (1 ft 3.7 in); trench 2.0 m (6 ft 7 in)



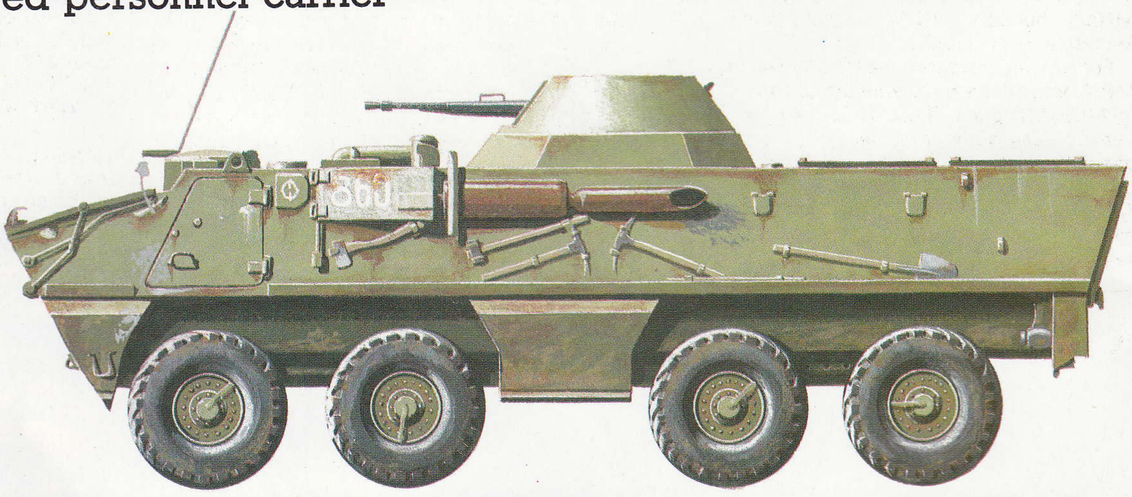
A BTR-60PB (8×8) armoured personnel carrier, powered by two petrol engines, each of which drives four wheels on one side of the vehicle. When afloat the vehicle is propelled in the water by a single water jet mounted in the hull rear.



A BTR-60PB (8×8) armoured personnel carrier swims ashore from a landing ship of the Soviet navy during exercises in the Red Banner Caucasian Military District.

CZECHOSLOVAKIA

OT-64 armoured personnel carrier



Above: The OT-64C(1) armoured personnel carrier and its earlier models are used by Czechoslovakia and Poland in place of the Soviet BTR-60 series.

Rather than employ the Soviet BTR-60P series of 8×8 armoured personnel carriers, Czechoslovakia and Poland decided to develop their own vehicle. This entered service in 1964 and in addition to being used by Czechoslovakia and Poland has also been exported to Hungary, India, Libya, Morocco, Sudan, Syria and Uganda. The main advantages of the **OT-64** over the Soviet vehicle are that the former is powered by a diesel instead of two petrol engines (giving a longer operational range and reduced risk of fire) and that the troop compartment is fully enclosed. The OT-64 is heavier than the Soviet vehicle, however, and has a lower power-to-weight ratio. Many of the automotive components of the OT-64 are also used in the TATRA 813 range of 8×8 cross-country vehicles, which are widely used for civil and military applications.

The hull of the OT-64 is of all-welded steel construction that provides protection from small arms fire and shell splinters, maximum hull armour thickness being 10 mm (0.39 in). The commander and driver are seated at the front of the vehicle with the engine to their immediate rear. The troop compartment is at the rear of the hull, and access to this is gained via two doors in the hull rear. Roof hatches are provided over the top of the troop compartment, and firing ports are located in the side and rear. The OT-64 is fully amphibious, being driven in the water by two propellers mounted under the hull rear at a speed of 9 km/h (5.6 mph); before the vehicle enters the water a trim vane is erected at the front of the hull and the bilge pumps are switched on. All vehicles have night-vision equipment, front-mounted winch and an NBC system.

The original member of the family, the **OT-64A** (or **SKOT** in Poland) was sometimes fitted with a roof-mounted 7.62-mm (0.3-in) machine-gun. The **OT-64B (SKOT-2)** has on the roof to the rear of the engine compartment a plinth on which is mounted a 7.62-mm (0.3-in) or 12.7-mm (0.5-in) machine-gun fitted with a shield. The **OT-64C(1)** or **SKOT-2A** has a one-man turret identical with that fitted to the BTR-60PB 8×8 APC and the BRDM-2 4×4 scout car; this turret is armed with a 14.5-mm (0.57-in) and a 7.62-mm (0.3-in) machine-gun. Some vehicles have been fitted with a wire-guided 'Sagger' ATGW on each side of the turret to give the vehicle an anti-tank capability. The **OT-64C(2)** or **SKOT-2AP** is used by Poland and has a new turret with a distinctive curved top which has the same armament as the turret of the OT-64C(1) but with an elevation of +89.5° to enable them to engage aircraft and helicopters. Other more specialized versions include a recovery vehicle and at least two command vehicles designated **R-2** and **R-3**.

Czechoslovakia also still uses a number of **OT-810** half-track vehicles. During World War II the Germans made the SdKfz 251 half-track at the Skoda plant in Pilsen, where production continued after the end of the war. In the 1950s many of these vehicles, by then designated the OT-810, were rebuilt and fitted with a diesel engine and overhead armour protection for the troop compartment. Most of the OT-810s have now been fitted with the 82-mm (3.23-in) M59A recoilless gun for use in the anti-tank role.

Below: The OT-64C(1) armoured personnel carrier has the same one-man turret as fitted to the Soviet BRDM-2 (4×4) and BTR-60PB (8×80) vehicles.

Specification
OT-64C(1)
Crew: 2+15
Combat weight: 14500 kg (31,967 lb)
Powerplant: one Tatra V-8 diesel engine developing 180 hp (134 kW)
Dimensions: length 7.44 m ((24 ft 5 in); width 2.55 m (8 ft 4.4 in); height overall 2.06 m (6 ft 9 in)
Performance: maximum road speed 94.4 km/h (59 mph); maximum road range 710 km (441 miles); fording amphibious; gradient 60 per cent; vertical obstacle 0.5 m (1 ft 7.7 in); trench 2.0 m (6 ft 7 in)

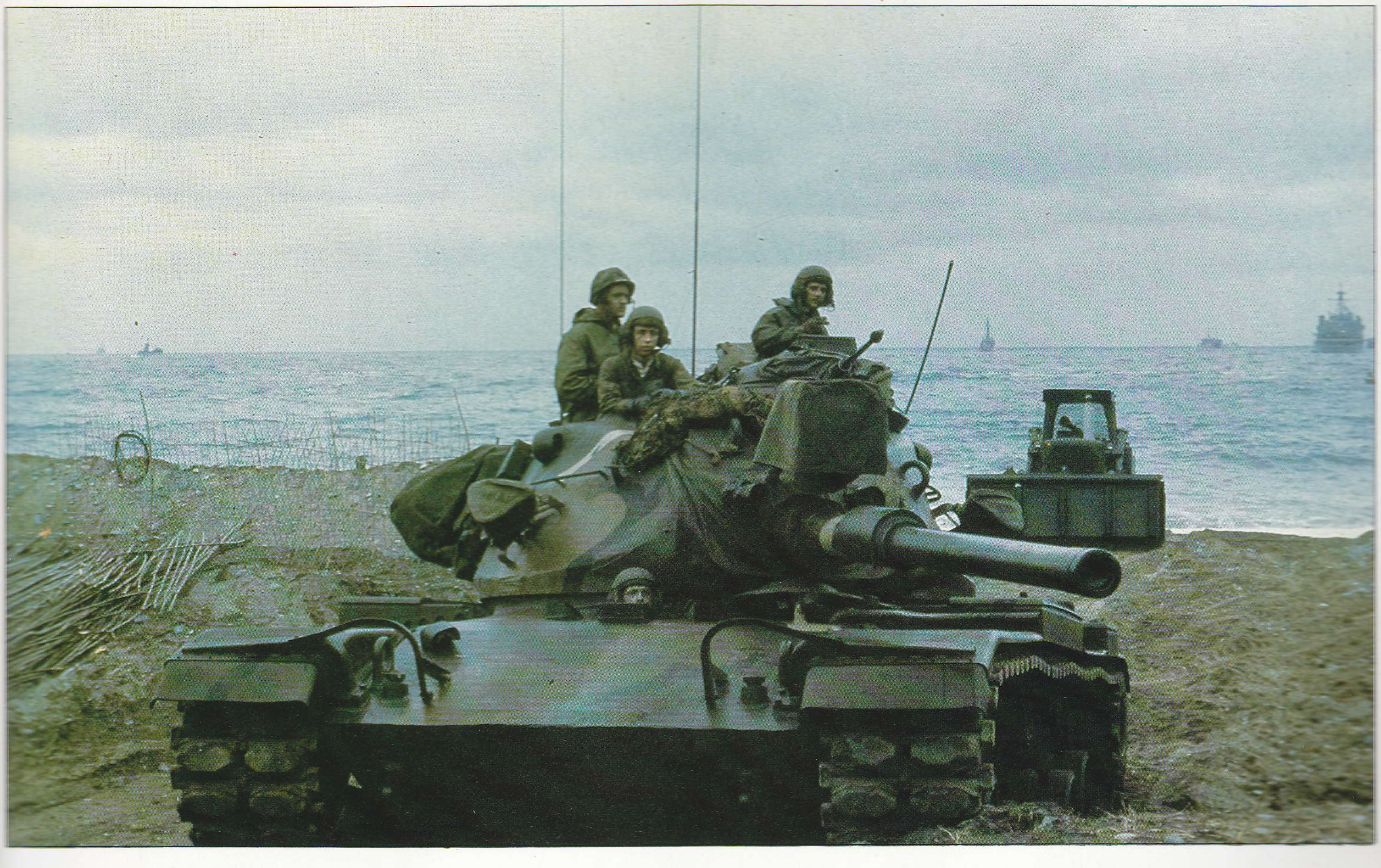
US Marine Corps

Equipment

Equipment at the individual level is much the same for the US Marine Corps as for the US Army. The basic combat weapon used by all ranks is the M16A1 5.56-mm (0.22-in) rifle, and the M60 7.62-mm (0.3-in) machine-gun is the squad weapon. At battalion level the 81-mm mortar is used, and each battalion has its own Dragon anti-tank missiles and Redeye or Stinger anti-aircraft missiles. As a rule, US Marine battalions must operate with less direct support than that provided for other fighting units, so they are worse supplied with artillery than comparable formations. Close support is expected to come from US Marine aircraft wings and from naval gun fire provided by the US Navy. Still, US Marines do have the 155-mm (6.1-in) M198 towed howitzer, and current plans are for some form of auxiliary power unit to be fitted to these howitzers for purely local moves across beaches and the like. The US Marine Corps also has a number of self-propelled artillery items such as the heavy 203-mm (8-in) M110A1 and a sizable force of 155-mm (6.1in) M109A1 howitzers. TOW heavy anti-tank missiles are also in good supply.

For armoured support, the US Marines have 575 M60A1 main battle tanks armed with 105-mm (4.13-in) M68 main guns. These tanks are good combat vehicles but somewhat heavy for amphibious operations (and not easily transportable by air, a problem the US Marine Corps shares with the US Army) so a search is now under way for a replacement, probably to emerge as a light tank with an automatic 75-mm (2.95-in) main gun. For direct fire support, the US Marines recently conducted a series of trials to determine exactly what type of vehicle would be required. This programme was a joint US Army/US Marine project and resulted in the Light Armoured Vehicle (LAV), a vehicle planned for production in various forms to suit a number of purposes. In the end the LAV emerged as a variant of the wheeled 8×8 MOWAG Piranha, originally a Swiss design but produced by General Motors of Canada. The LAV will be produced in a variety of forms, from a version with a 90-mm (3.54-in) gun to a version with 25-mm Chain Guns, 81-mm mortars,

United States Navy Landing Craft Mechanized (LCM), loaded with M60 MBTs, back out of the docking well of a Landing Ship Dock (LSD). In the future LCMs will be partly replaced by hovercraft, which will have a much higher speed and therefore be less vulnerable to enemy fire.



An M60A1 MBT of the US Marine Corps heads inland after being landed on the beach. This will be replaced by the M1 Abrams MBT, which has been in service with the US Army for several years. In the past the Marines have often been re-equipped years after the Army.

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TOW missile-armed vehicles, and so on. Costs have risen alarmingly, threatening the success of the LAV programme. In any event the M60A1 will be around for some years to come.

The other US Marine Corps armour component is the LVTP-7 amphibious armoured personnel carrier. While the LVTP-7 is a very successful design of its kind, the amphibious requirement makes it a high and bulky vehicle. It does have its own built-in armament in the form of 12.7-mm (0.5-in) machine-guns, and there are specialized recovery and engineer variants.

The replacement 'new-generation' assault vehicle is the LVT7A1 manufactured by the FMC Corporation of Chicago in three basic configurations: (1) personnel carrier, capable of transporting 25 combat-equipped troops (in addition to its crew of three) or 4536 kg (10,000 lb) of cargo; (2) mobile command post, equipped as a communications centre; and (3) recovery vehicle outfitted with a hydraulic, telescoping crane with a 2722-kg (6,000-lb) capacity, a 13608-kg (30,000-lb) capacity recovery winch, plus cutting, welding and other portable maintenance equipment. Some 984 earlier LVTP-7 vehicles will be modernized to LVT7A1 standard, and 329 more of the vehicles will be assembled from new production by 1986.

The US Marine Corps is looking even further ahead, however, to a replacement for the LVT7A1, and has eventual plans for a Landing Vehicle Assault (LVA, not to be confused with the LAV), but costs are escalating and it may develop that this requirement will have to be met by a special version of the US Army's M2 Bradley fighting vehicle.

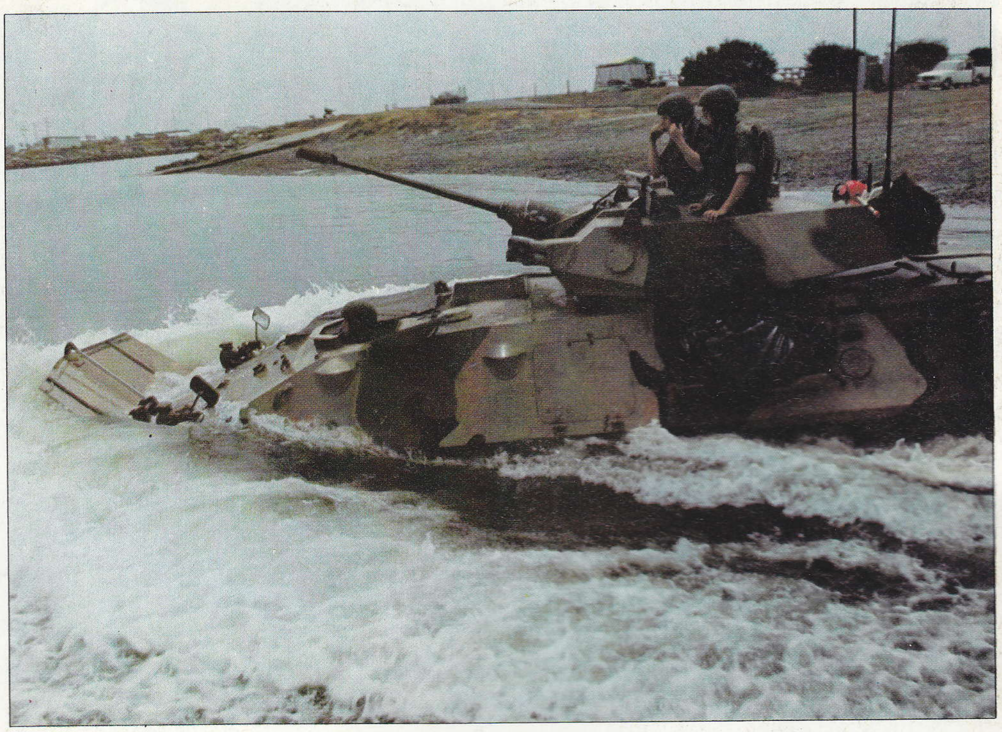
At present, the US Navy operates only enough specialized assault ships to accommodate one Marine Amphibious Force at any given time, though it is the policy of the Department of Defense under Secretary Caspar Weinberger to prepare for what Weinberger calls a 'Two and a half war (at the same time) capability'. Assault ships are highly specialized vessels with provision for carrying landing boats or LVTP-7s along the sides, and most have internal hangars for further stowage of both. The vessels have helicopter landing decks and extensive communications equipment. Command centres are provided in each ship, but one vessel is usually designated the 'flagship' or overall command vessel and retains the bulk of the command and control facilities. Unfortunately, many of the assault ships are of the LSD-28 class laid down many years ago and now approaching the end of their useful lives.

The US Navy has on charge no less than 65 specialized assault ships of various kinds, but at any one time far fewer are available for use. Top of the command structure are two 'Blue Ridge'-class landing craft command (LCC). Five of the 'Tarawa'-class amphibious general assault ships (LHAs) are in a sense small aircraft-carriers, being able to carry BAe AV-8A or McDonnell Douglas AV-8B Harrier attack planes and CH-46 or other helicopters. Harriers or helicopters can also be carried by the seven 'Iwo Jima'-class helicopter carriers. There are no fewer than 14 vessels of the landing platform, dock (LPD) and 13 of the landing ship, dock (LSD) type. M60A1 main battle tanks are carried in landing ship, tank (LST) vessels whose vintage traces to the amphibious campaigns of World War II, there being 18 such vessels of the 'Newport' class in service. To back up all of these vessels are six 'Charleston'-class amphibious cargo ships (LKAs), 44 replenishment ships and 20 depot and repair ships.

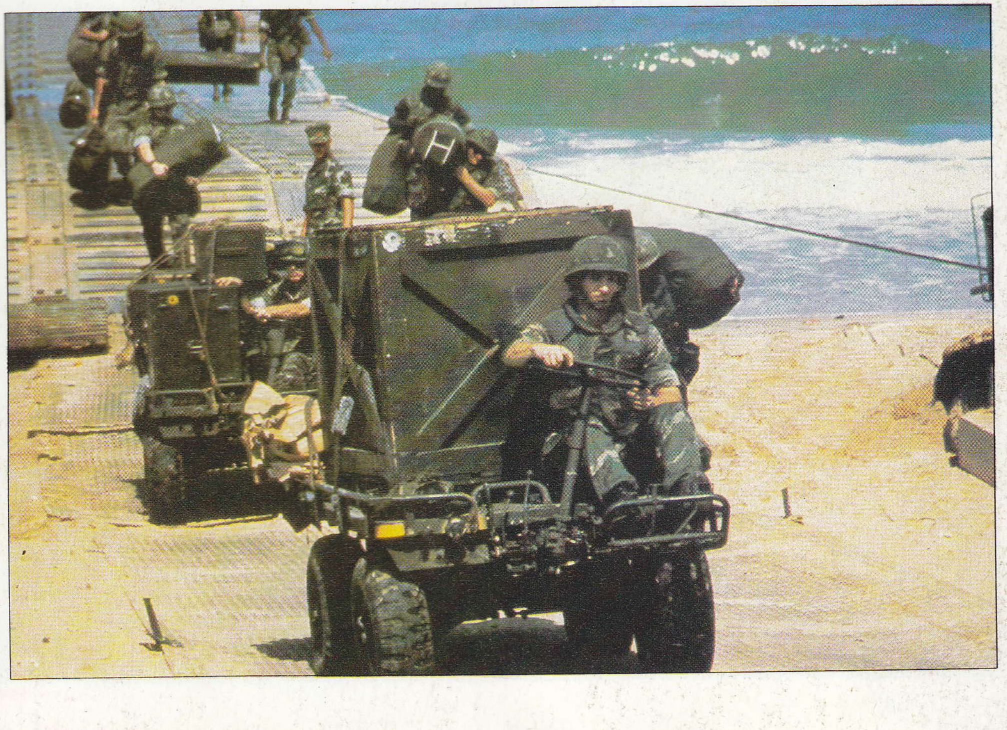
The first two vessels of the new 'Whidbey Island' or LSD-41 class of assault ship are now under construction to improve significantly the US Marines' rapid-response and amphibious capabilities. 'Impressive' is the word used by General Barrow for these vessels. The US Navy will build at least 10 of these larger and more modern assault ships, and possibly as many as 16.

The US Navy will also request funds in its Fiscal Year 1985 budget to build a new class ship, the LHD, which will be capable of launch and recovery of other fixed-wing aircraft in addition to Harriers, as well as helicopters. Both the LSD-41 and the LHD will have the capability to carry a new hovercraft, the landing air cushion craft, being procured to support movement of the amphibious force ashore.

Further enhancements in strategic mobility will be achieved through a programme wherein matériel capable of supporting three US Marines brigades will be embarked aboard specially configured merchant ships of the Military Sealift Command. These ships, maritime prepositioning ships, capable of offloading in port or over-the-shore in a permissive environment, will be positioned at strategic locations from which they can be moved rapidly into a crisis area. US Marines would be flown into the area to be joined with their equipment. Deployment in this manner takes advantage of the heavy lift and loiter capability of ships and the speed of airlift to get the US Marine brigade to the crisis area rapidly.



A US Marine Corps LAV-25 (Light Armoured vehicle) enters the water during amphibious trials held at Twenty Nine Palms, California. The LAV-25 is built by General Motors of Canada, and is fitted with a two-man power-operated turret armed with a 25-mm Chain Gun, which is also fitted to the M2.



Marines transport equipment ashore with their M274 (4×4) Mechanical Mule light vehicles. These will soon be phased out of service in favour of the AM General High Mobility Multi-purpose Wheeled Vehicle (HMMWV) which has much greater capacity.